WIRE AND WIRE PRODUCTS

JULY 1941

SOMETHING TO THINK ABOUT

3-SHIFT OPERATION... 7 DAYS A WEEK ?

● If matters come to this pass in the defense production of wire— ONE thing you WON'T have to worry about is the performance of your

VAUGHN WIRE DRAWING MACHINERY

PRESIDENT

THE VAUGHN MACHINERY CO.
Cuyahoga Falls, Ohio, U. S. A.

Complete Wire Drawing Equipment . . . Continuous or Single Hole . . . for the Largest Bars . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or Their Alloys

OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION

THE FURNACE OF THE FUTURE

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For ANNEALING COILED OR FLAT, RODS, BARS, WIRE OR STRIP

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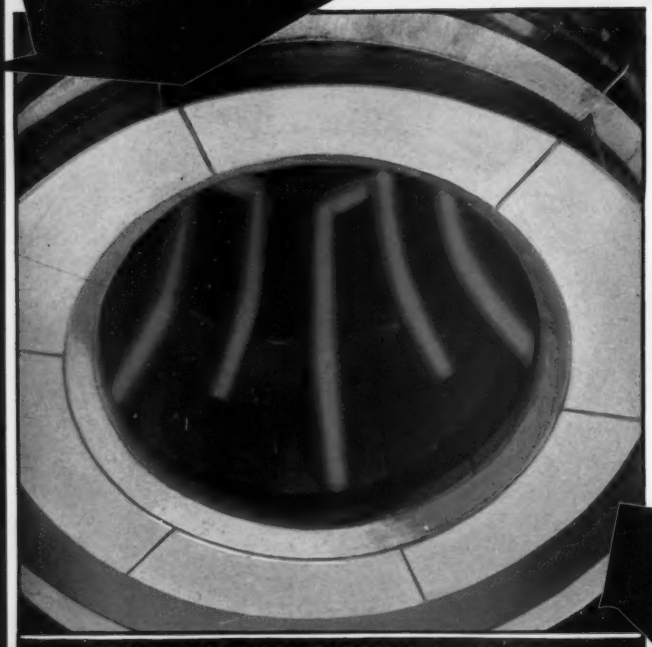

THE WILSON FIRING RETORT—
TUBES IN THE INNER COVER

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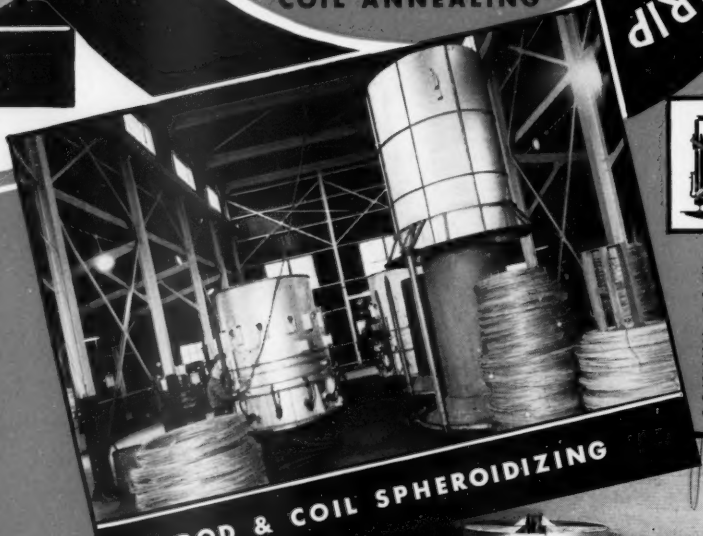
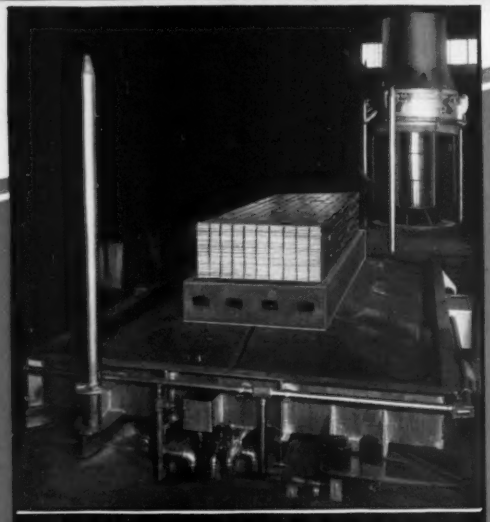
COIL ANNEALING



ROD & COIL SPHEROIDIZING



HIGH CARBON COILED AND
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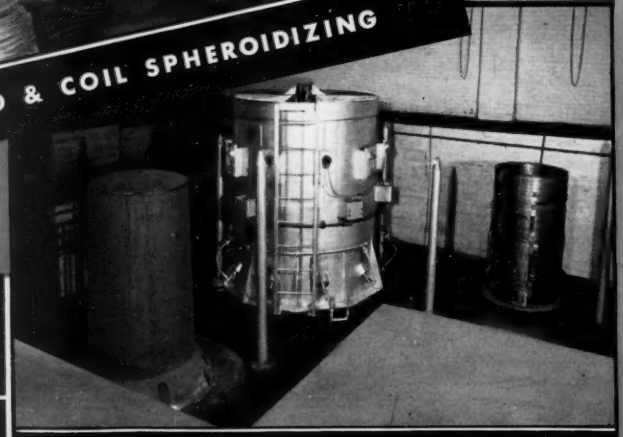

HIGH CARBON STRIP COIL ANNEALING

• The Wilson Annealing Unit is covered by Patents Numbers 1952402, 2068477, 2078356, 2081612, 2089843, and other patents pending.

12 OF THESE NEW FURNACES OPERATING
5 MORE UNDER CONSTRUCTION

An Exclusive Development of

LEE WILSON ENGINEERING CO

1370 Blount Street • Cleveland, Ohio

Checking die nibs for concentricity, one of many checks to insure quality in Carboloy dies. Through increased facilities and manpower, quality inspection at Carboloy is speeded up but never "rushed"

Although we at Carboloy are now producing more Carboloy cemented carbide* in one month than during the entire year of 1938 . . . although we are now engaged in our second expansion program within one year in order that an adequate margin of capacity can be maintained to anticipate still pyramiding demands . . . although many things have been done, are being done, here at Carboloy to meet rush defense requirements—there is no rush where quality is concerned. All essential checks on quality are still retained to insure that the die you receive can be depended upon to do your job efficiently.

Any other procedure is obviously false time-economy.

*Including powdered metal for British Empire.

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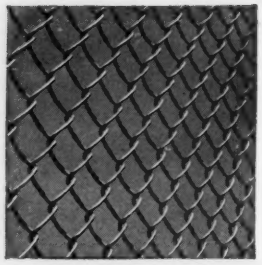
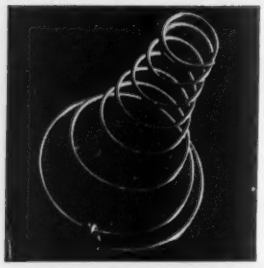
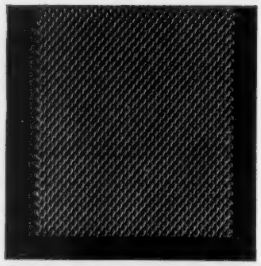
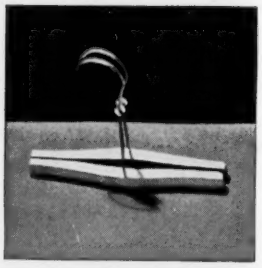
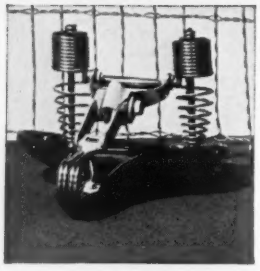
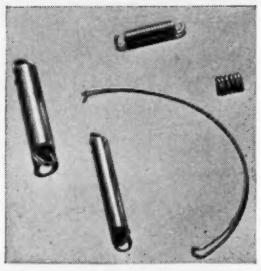
DRAWING AND SIZING DIES





If your Product is shown here...

Read this two-minute story

Take a good look at this group of wire products. Is your product shown here?

If it is, and you are not now using bethanized wire, you may be overlooking a chance to save time, cut production costs, and increase the quality of your finished product.

Here's why:

Bethanized wire will stand virtually any commercial forming operation without flaking, peeling or cracking. You may twist this wire into a pigtail, bend it flat back on itself, or draw it through dies to a fraction of its size, without harming the coating in any way or reducing the percentage of zinc to steel.

If your product needs extra protection against corrosion, bethanized wire offers you two coating weights that are, respectively, two and three times as heavy as specifications call for in a standard double galvanized coating. Current A.S.T.M. tests definitely indicate that these heavier coatings will give double and triple protection against corrosion.

Summing up: A bethanized coating is the tightest, purest, most uniform and ductile zinc coating ever applied to wire. In standard "A" coating weight (the equivalent of standard double galvanizing) a bethanized coating costs no more than any other zinc coating.

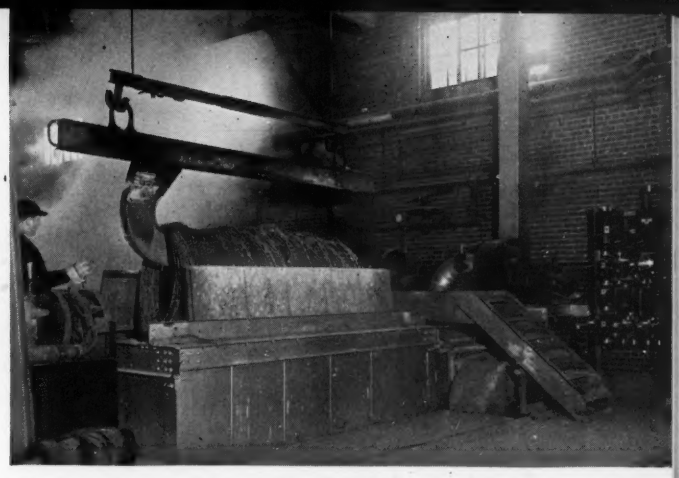
We'd like to have you investigate bethanized wire. It is taking on new and tougher jobs every day and giving a fine account of itself.

BETHANIZED WIRE

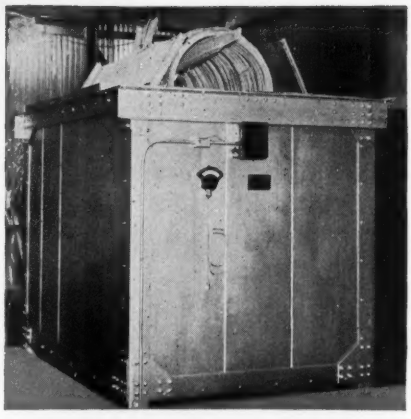
BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

CARL MAYER



Carl-Mayer Hi-Speed Rod Baker such as installed at Johnson & Nephew, Sheffield, England, Wickwire-Spencer Steel Co., Atlantic Wire Co., etc.



This first installation at the Steel Co. of Canada, Hamilton, Ontario, roon lead to second order at same plant.

You know...

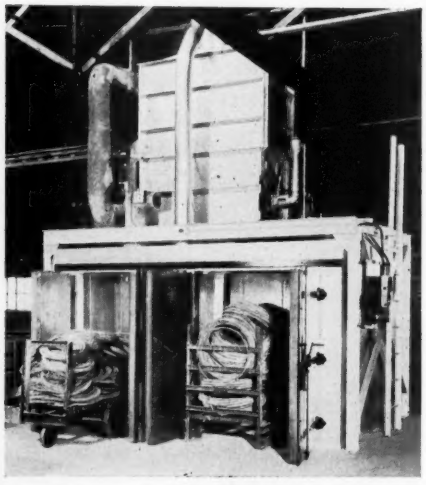
in buying equipment, it's the results that prove the wisdom of the investment.

• That's why you are bound to take into consideration the far-reaching advantages of Carl-Mayer equipment in the Rod and Wire baking field.

Concerns such as these have bought Carl-Mayer Rod Bakers, Wire Bakers, etc., and will back our claims for a big lead in speed, efficiency and fuel economy over competitive types.

Allegheny-Ludlum Steel Co.
Atlantic Wire Co.
Johnson & Nephew, Limited, Sheffield, England.
Pittsburgh Tool Steel Wire Co.
Steel Company of Canada.
Wickwire-Spencer Steel Co.

Investigate NOW! Ask us to send an engineer to survey your situation and report what you can expect from Carl-Mayer superiority.



Carl-Mayer Wire Baker at Pittsburgh Tool Steel Wire Co.

ROD and WIRE Bakers

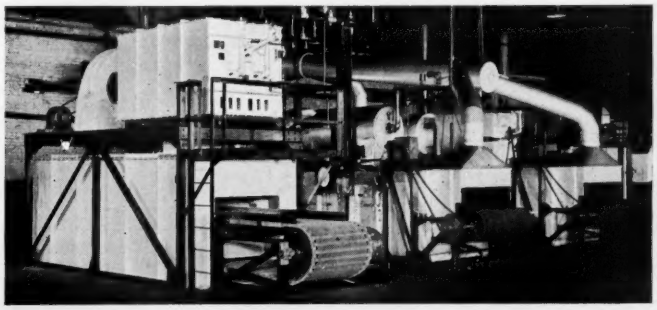
PATENT NOS.

U. S. A.	2235559
Canada	396144
Canada	465969

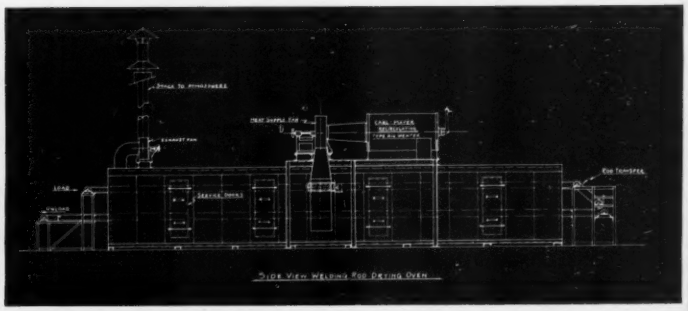
Other Patent Claims Allowed and Pending

The CARL-MAYER CORPORATION
3030 EUCLID AVE., CLEVELAND, OHIO

INDUSTRIAL FURNACES . . . WELDING ROD OVENS



Battery of Carl-Mayer Recirculating Air Type Furnaces similar to installations made for Timken, Ford Motor, Hyatt, Heywood Wakefield, Aluminum Co. of America and other outstanding companies—for stress relief, drawing, tempering and heat treating a variety of products. Temperatures to 1300°F. Uniformity ±2½°F.

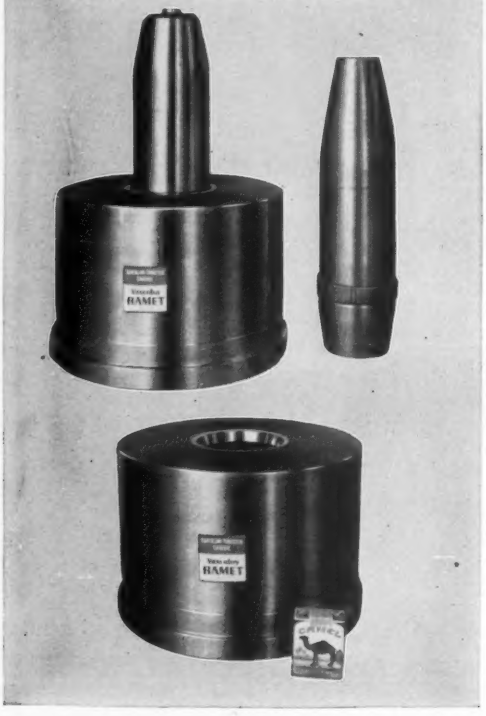


Carl-Mayer Welding Rod Oven as built for the Page Steel & Wire Co. and The Hollup Corp., for drying coated welding rods, using the "Mayer" Recirculating Gas Fired Air Heater Principle and rod transfer systems (patents pending).

Again!

VASCOLOY-RAMET Dies Accomplish the "IMPOSSIBLE" On a Vital Defense Job

The Largest Carbide Dies Ever Made (13" diameter by 8¼" high) are used for cold nosing 105 mm. (4.134") shells on an ordinary press at the rate of 120 shells per hour, effecting great savings.



NOSING of artillery shells involves a problem common in wire drawing—scoring, galling and "pick-up"—only to a greater degree. Because of this difficulty, cold nosing with ordinary dies has been rather expensive.

Tantalum carbide, with its peculiar lubricating properties, has overcome this problem completely, and cold nosed shells can be formed on an ordinary press as fast as they can be handled. Scoring is a thing of the past, and die life is increased beyond computation.

Die costs per shell are so drastically reduced that, compared either with cold nosing through steel dies, or hot nosing, savings in time, material and cost are of tremendous proportions.

This important new application proves again that Vascoloy-Ramet Dies—the original tantalum-tungsten carbide dies—produce smooth finish, even on materials difficult to draw.

And it proves that it pays to consult with Vascoloy-Ramet on all drawing or forming operations.

VASCOLOY-RAMET CORPORATION

NORTH CHICAGO, ILLINOIS

An affiliate of

FANSTEEL METALLURGICAL CORPORATION

and

VANADIUM-ALLOYS STEEL COMPANY

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Vascoloy RAMET

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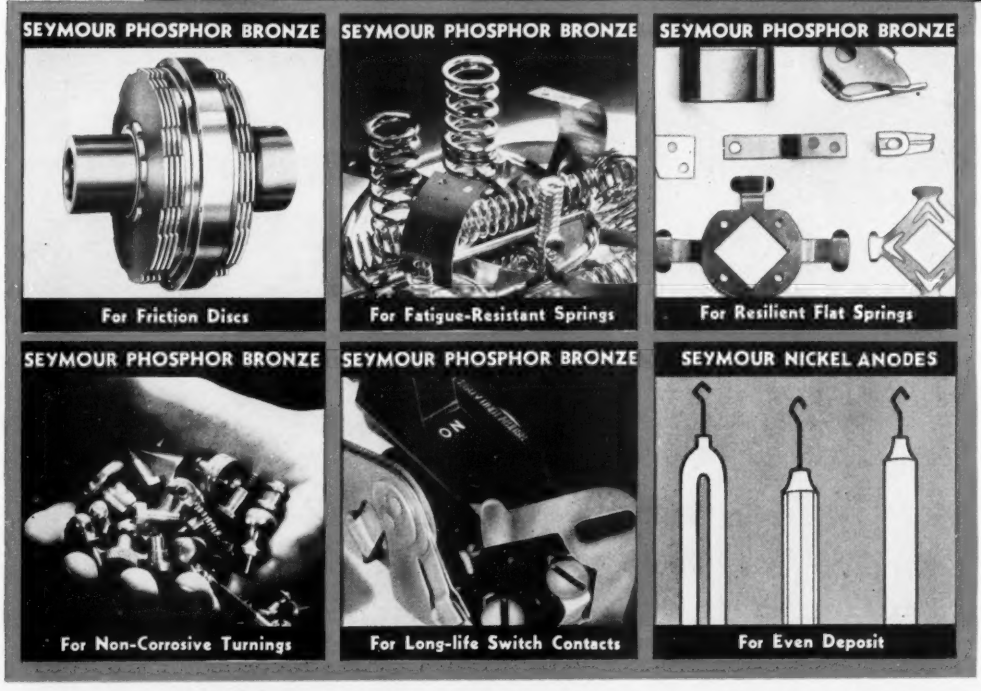
THE SUPERIOR TANTALUM-TUNGSTEN CARBIDE DIES

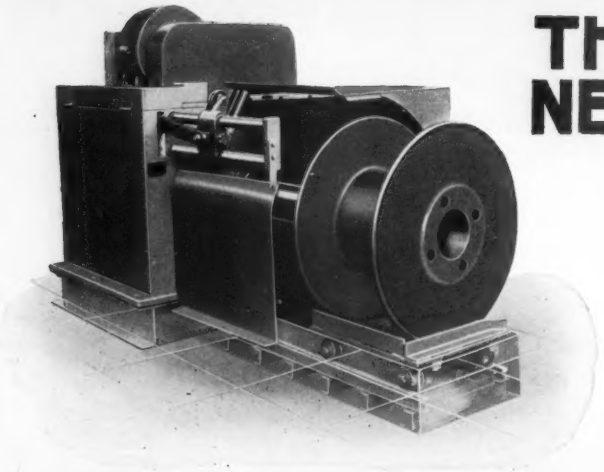
Picturizing SEYMOUR SERVICE

SEYMOUR



THE SEYMOUR MANUFACTURING COMPANY, 62 FRANKLIN ST., SEYMOUR, CONN.

Syncro presents



THE NEW T-ONE SPOOLER

By using the bull or motor block coiler as a capstan, and spooling wire on the new Syncro heavy duty T-1 spooler, wire production can be considerably stepped up. This is because this layout, by spooling 2000 lb. reels, greatly reduces shut down periods and thus makes production more nearly continuous.

The Syncro T-1 spooler handles 2000 lb. capacity reels with floor level loading and unloading by means of a pneumatically controlled dolly. A Syncro expanding arbor raises and lowers the reel from and to the dolly, and holds the reel firmly in position without the use of driving pins.

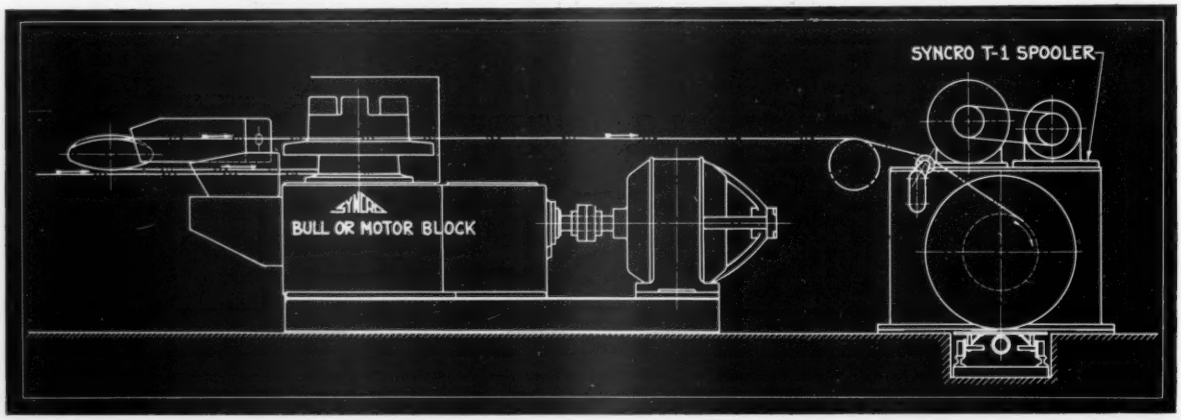
The Syncro T-1 spooler is equipped with the Syncro magnetic slip clutch, which maintains uniform wire tension during the entire spooling operation and which permits adjustment of the wire tension while the unit is operating.

Complete details will be sent at your request.

SYNCRO • MACHINE • COMPANY

Rahway, New Jersey — McCormick Bldg., Chicago

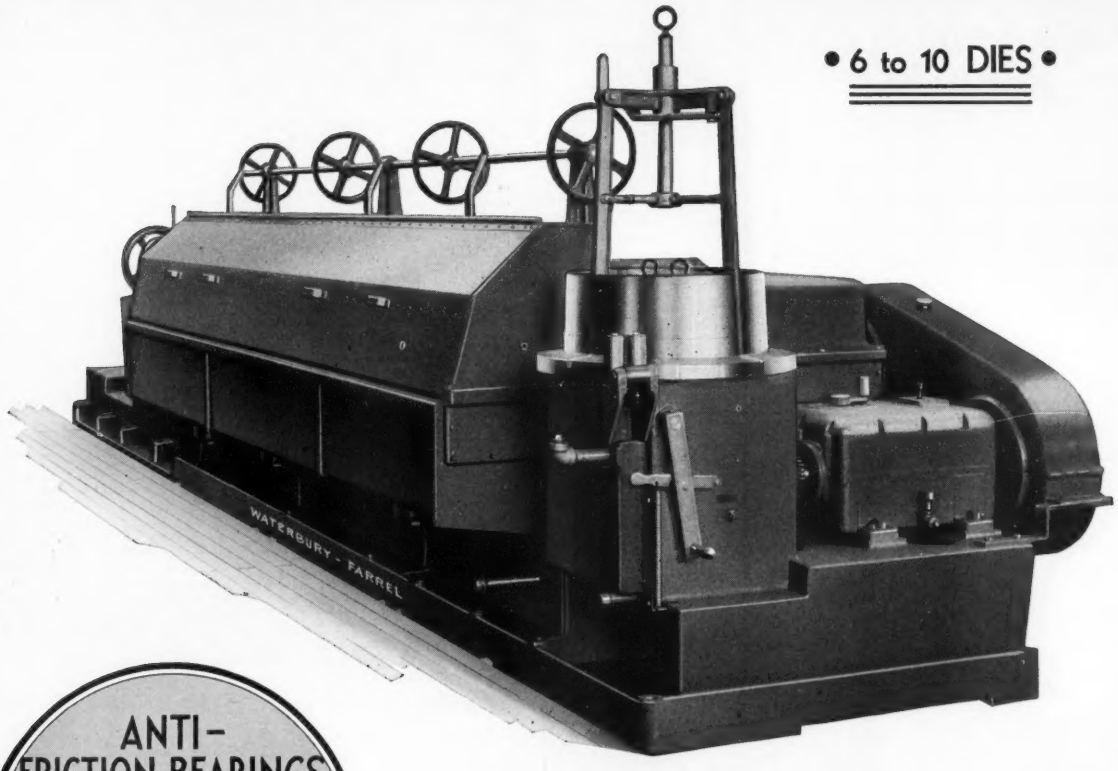
Represented in Canada by — Canadian Elevator Equipment Co., Ltd., Toronto



WATERBURY-FARREL

NO. 1 TANDEM WIRE DRAWING MACHINE - FOR BRASS OR COPPER

• 6 to 10 DIES •



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BEVEL GEARING

Change gearing provides four finishing speeds with a single speed AC main motor.

Block driven through a clutch which may be disengaged to permit rotation by hand.

THE WATERBURY FARREL FOUNDRY AND MACHINE COMPANY

WATERBURY, CONNECTICUT U.S.A.

CLEVELAND CHICAGO NEWARK, N. J.

WHERE "TIME OUT" SPEEDS PRODUCTION

Morgan-Connor High Block design provides a *time delay* between drafts.

This feature makes it possible to draw *High Carbon* as well as Low Carbon Wire at *high speeds.*

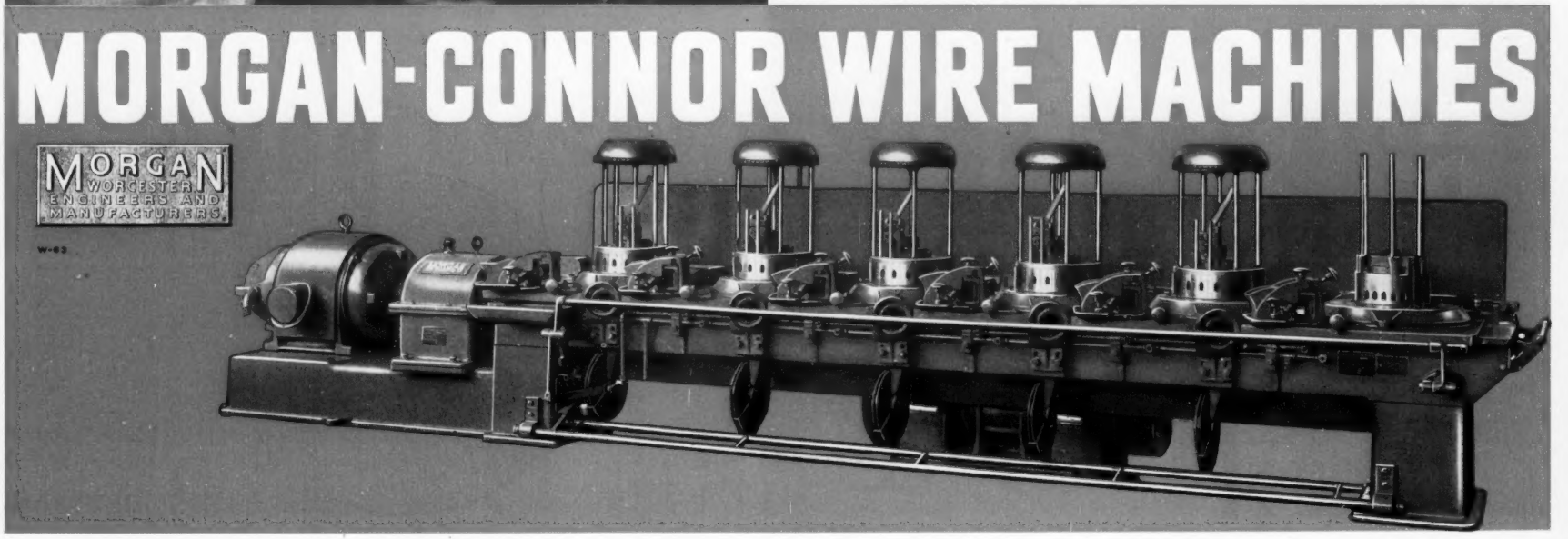
For the wire is stored on each block, and the dissipation of the heat is accomplished by means of a blast of cool air. Thus the machine draws and coóls, draws and cools, draws and cools . . .

Other features include compactness, direct drive, modern safety features, and Morgan durability.

MORGAN CONSTRUCTION COMPANY, WORCESTER, MASS.

Continuous Wire Drawing Machines; Take-up Frames; Horizontal Bull Blocks; Vertical Spindle Bull Blocks; Reels; Pointers; Wire Mill Accessories

MORGAN-CONNOR WIRE MACHINES



WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable

DRAWING—ROLLING—EXTRUDING—FORMING—FABRICATING

Vol. 16 JULY, 1941 No. 7

Designated as

Official Publication By The Wire Association

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ARE YOU COMING TO PHILADELPHIA, PA. OCTOBER 20-24, 1941

To Attend The Eleventh Annual Convention of the Wire Association?

✦ ✦ ✦

CONVENTION HEADQUARTERS WILL BE AT THE HOTEL PHILADELPHIAN

✦ ✦ ✦

A splendid opportunity is offered to discuss informally, routine production problems and to exchange opinions and ideas regarding equipment and processes used in the industry.

For this purpose informal gatherings are held at the Wire Association headquarters in the Hotel Philadelphian, which are open from 9 A. M. to 11 P. M. during the convention.

Every wire production executive engaged in the manufacture or fabrication of wire and wire products of any kind is invited to join The Wire Association and attend these meetings.

✦ ✦ ✦

THERE WILL BE A REGISTRATION FEE OF $5.00

✦ ✦ ✦

MAKE YOUR PLANS NOW TO ATTEND

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300 Main Street Stamford, Conn.

SETS THE PACE IN 75% OF THE NATION'S WIRE MILLS

FIRTHALOY Round Hole Draw Dies have never been surpassed for consistent high quality and sheer ability to give continuous, on-size production for unbelievably long periods. That's why they are predominant favorites the country over.

Despite unprecedented demands for Sintered Carbide Dies, Firth-Sterling has not and will not compromise quality or relax inspection vigilance. For upon the positive maintenance of FIRTHALOY standards depends the welfare of an industry. You can rely on it—today's Firthaloy Draw Dies will draw more wire, at higher speed, to closer tolerance, with better finish, and at lower cost than ever before!

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WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip. Wire Products and Insulated Wire and Cable.

DRAWING --- ROLLING --- EXTRUDING --- FORMING --- FABRICATING

Vol. 16 JULY, 1941 No. 7

A Practical Discussion of Zinc-Iron Alloys

By Wallace G. Imhoff,
Metallurgical Engineer,
Vineland, N. J.

A very large amount of technical material is available on the nature of, and behavior of zinc-iron alloys. Much of it concerns the theory of zinc-iron alloys, and therefore the commercializing of the information, in so far as the galvanizer is concerned is difficult. The idea at this time is to take the same information and background, and to try to explain the behavior of zinc-iron alloys in a practical way so that the information can be put to actual practical use, that is commercialized, and money value gotten out of it. ✦

Conception of Zinc-Iron Alloys

THE practical galvanizer's conception of zinc-iron alloys has its background in the dross that he removes from the galvanizing pot. He knows very little about what is actually taking place other than at times the dross formation is heavy; or that the dross accumulation is accelerated by an increase in the bath temperature; and that the dross production is related to the production put through the bath; that sometimes the dross is heavy, and dry; that other times it may be "slushy," and contain a large quantity of good zinc. He has learned from practical experience that what he calls "dross" is cold frozen bath and crystals that he has shoveled from the bottom of the pot, cut and sliced, and put into dross molds. In the back of his head however, he knows that the dross is actually these crystals that collect at the bottom of the bath. He has assumed that all of the crystals are the same kind, and as to the behavior of the crystals he feels there is something mysterious about them, because he, too, has had the old saying passed on to him, "that dross makes dross."

WALLACE G. IMHOFF
President, The Wallace G. Imhoff Co.

✦ ✦ ✦

The Theory of Zinc-Iron Alloys

AND then there are other men called "scientists" who have made a study of dross and zinc-iron alloys, but somehow the gap between theory and practice is still very wide. The scientist talks about definite compounds made up of one part of iron and three parts of zinc, or one part of iron and seven parts of zinc, and he mentions other combinations, but even he does not seem to fully know or understand these zinc-iron alloys. He is dealing with fixed conditions, while the practical galvanizer feels his conditions are always changing conditions, and nothing is fixed; the dross varies with the bath temperature, production, and dozens of other live, moving, phases of galvanizing. An attempt will be made in this discussion to join the theoretical scientific conception of zinc-iron alloys, with the practical operating conditions of galvanizing, so that some dollars and cents value can be gotten out of what

Designated as Official Publication by the Wire Association

both the galvanizer and the scientist know about zinc-iron alloys.

✦ ✦ ✦

There Is No Dross in Pure Zinc

SOME years ago when the whole subject of dross and zinc-iron alloys was being studied and carefully investigated, the question of whether there was ever any dross in pure zinc came up. In order to find out some of the very purest chemical zinc was obtained, and melted up in a special crucible to the various temperatures used in various fields of galvanizing. The crucible was a clay crucible, and there was no iron present, even in the form of discoloration as iron oxide in the clay. Thus a condition was established in which absolutely no iron was available, and the zinc was chemically pure zinc, thus eliminating any iron in the zinc. This zinc was then melted to temperatures found in various practical fields of galvanizing, and no trace of dross, or any zinc-iron alloy could be seen. Thus we have as a starting point of the study of dross and zinc-iron alloys, pure zinc, and we find that no dross, or zinc-iron alloys are formed when pure zinc is heated to galvanizing bath temperatures. PLATE 1 shows this bath section as seen under the microscope. The crack is where the zinc crystals have not entirely fused together. The clear pure zinc crystals can be seen on each side of the crack.

✦ ✦ ✦

There Is No Dross in Pure Rolled Zinc

SOME of the very purest rolled sheet zinc was obtained, and again it was studied for some evidence of dross, or the presence of zinc-iron alloys. As can be seen from PLATE 2, there is absolutely no evidence, or trace of the presence of either dross or zinc-iron alloys. The texture is seen to be very fine, as the rolling has crushed and mashed the zinc crystals to bits. ✦ ✦ ✦

There Is No Dross in A Good High-Grade Brand of Prime Western Zinc

SO by careful study and examination it has been found that there is no dross, or no zinc-iron alloys are formed when pure zinc is melted to various galvanizing bath temperatures. The same facts hold true for chemically pure, rolled sheet zinc. So the next step which is logical from a practical standpoint is to go out on the open market and get a good high grade standard brand of Prime Western slab zinc and see if there is any dross, or zinc-iron alloys in that at ordinary galvanizing bath temperatures. The specification for Prime Western zinc specifies that the iron content of the zinc must be under 0.08 of 1 per cent iron. The sample of slab zinc obtained showed 0.04% of iron when it was analyzed for iron content. A piece selected as an average piece of the slab was examined just as received. PLATE 3 shows the slab zinc under the microscope, and absolutely no trace of dross, or zinc-iron alloys could be found. The zinc crystals can be plainly seen. ✦ ✦ ✦

There Is No Dross or Zinc-Iron Alloys Formed When This Prime Western Slab Zinc Is Melted, and Heated to Galvanizing Bath Temperatures

IN order to discover if heating alone would produce dross or zinc-iron alloys in this slab zinc it was heated entirely out of contact with any iron, and as a melt was raised to various hot-dip galvanizing bath temperatures. The melt was allowed to slowly cool. PLATE 4 shows the very large zinc crystals that formed on cooling. Here again as with all of the others, no trace of any dross or zinc-iron alloys can be found.

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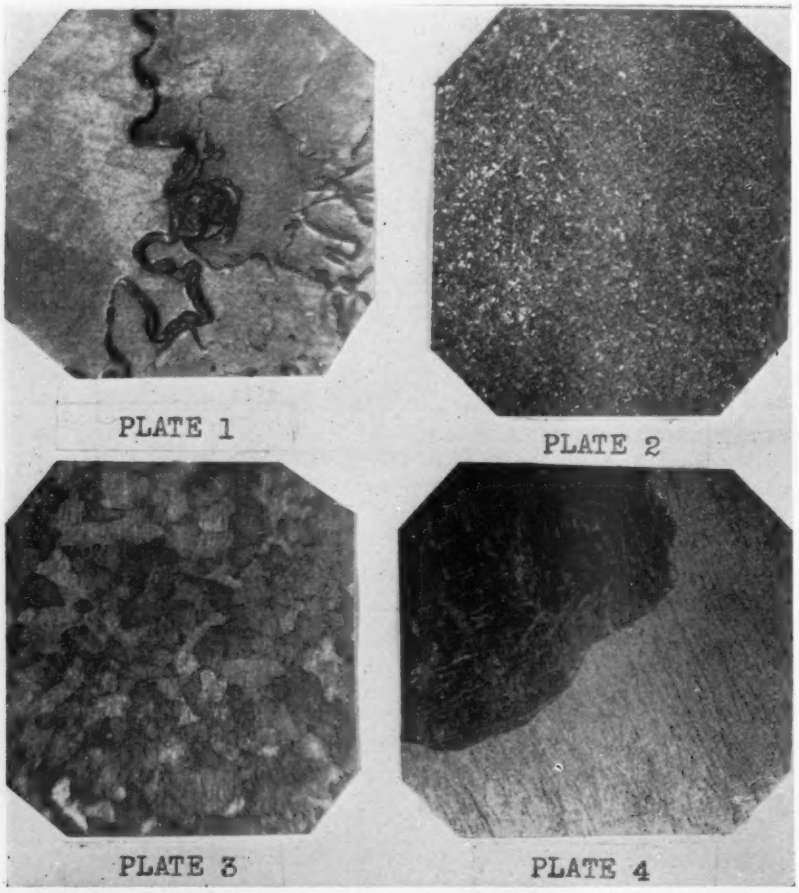
Conclusions

1. **No dross or zinc-iron alloys are formed when pure zinc, either in sheet form, or any other form, is heated to galvanizing bath temperatures, out of contact of iron.**
2. **No dross or zinc-iron alloys are formed when a high grade Prime Western slab zinc is heated to gal-**



1. Chemically pure zinc melted at galvanizing bath temperature.
2. Pure rolled sheet zinc—chemically pure.
3. A good brand of Prime Western zinc.
4. High grade Prime Western slab zinc heated to galvanizing bath temperatures.

vanizing bath temperatures, out of contact with iron.

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Contact of Zinc and Iron

THE next practical angle in the study of zinc-iron alloys is the phase where it is possible for zinc and iron to come in contact with each other. We might from the galvanizer's standpoint, which is a practical one, call attention to three very important sources of iron. These are—

(a) From the galvanizing pot.
(b) From the surface of the production going into the bath.
(c) From reduction of iron salts from the pickling baths, or from corrosion that has formed on the work, while waiting to be galvanized.

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A Two Phase System

IT is important now to recognize that the zinc-iron alloy system now has become a two phase system. On the one end is the zinc in the galvanizing pot; on the other end is the iron which the galvanizing pot is made from; here is zinc at one extreme and iron at the other. Zinc melts at 786 degrees F.; iron (Firebox steel) at 2600 to 2700 degrees F. It is evident at once that the molten zinc at galvanizing bath temperatures cannot melt the iron. It must be attacked and dissolved by the molten zinc.

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Zinc Is A Very Peculiar Metal

THE more one studies the metal zinc, the harder it is to explain some of its hidden powers. It is an extremely powerful reducing agent, and this accounts for the fact that iron salts from the pickling baths, or soft iron in the form of corrosion are easily and quickly reduced by the molten zinc at galvanizing bath temperatures. But even below the melting point of zinc it has hidden powerful properties, since **Rigg** has shown that there is fusion and the formation of alloy cones even below the melting point of zinc. The writer has studied this metal for over twenty years, and the most plausible explanation seems to be that its power may be due to the presence of other very rare metals such as Gallium, and two or three others that are known to be associated with zinc and zinc ores. The fact remains that molten zinc at, and above galvanizing temperatures attacks the galvanizing pot, takes up iron from the production passing through the galvanizing bath, and reduces iron salts and iron oxides, brought into the bath as pickle salts, or in the form of corrosion on the surface of the base metal. Pure zinc has an extremely powerful affinity for iron, and it is due to this fact, that not only a heavier coating is obtained when using pure zinc in the bath, but also a tighter coating; that is the coating has greater adherence to the base metal.

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Saturation First Condition

ALL practical galvanizers know that it takes a short time after the zinc has been become molten in a new bath, to become saturated with iron. It must become saturated with iron before the dross crystals appear in the bottom of the pot. There are a number of vital factors that influence the length of the time between saturation and the appearance of the dross. The writer knows of one case where the metal was molten at 12 o'clock at night, and the next morning, with brand new zinc in the pot, there was over two ton of dross in the pot. The fact brings to light the most important factor in studying zinc-iron alloys; namely, temperature. The quantity of iron that molten zinc will take up, and the speed of taking it up, is a direct function of the temperature. The higher the temperature, the more active the zinc becomes, and the faster the zinc-iron alloy forms.

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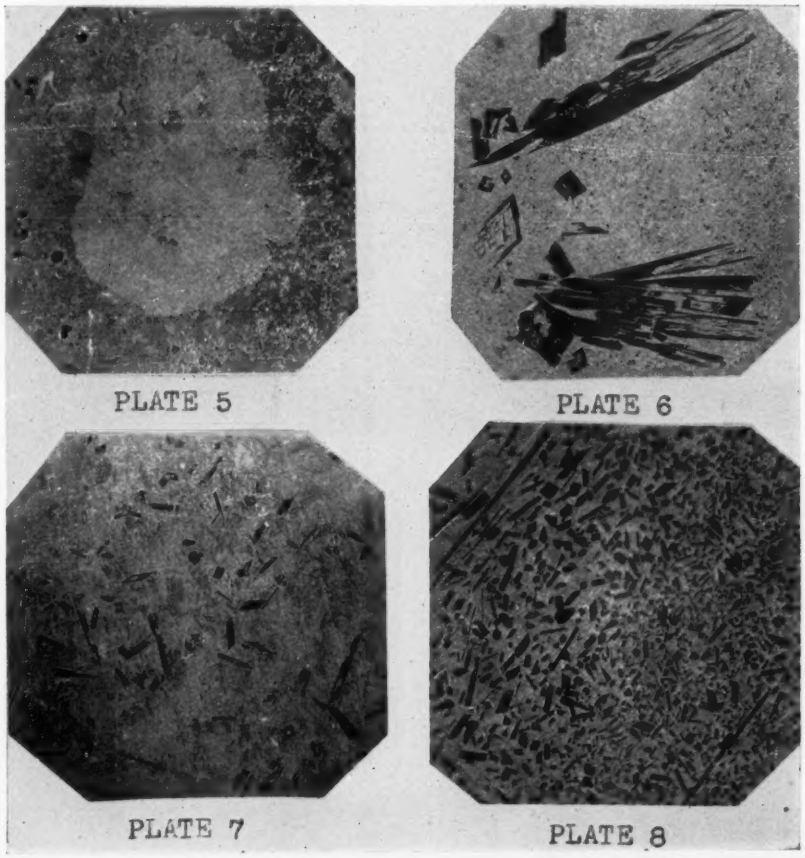
THE iron first goes into solution in the molten zinc. The solution might be compared to sugar or salt dissolving in water. According to the temperature, a point is finally reached when the molten zinc cannot hold any more iron in solution. At low temperatures



5. A Patch of zinc-iron alloy; the light area in the center.
6. The formation of zinc-iron alloy crystals.
7. Zinc-iron alloy crystals cut at various angles.
8. Galvanizer's dross showing long slender zinc-iron alloy crystals.

this occurs at about 0.10 per cent of iron in the zinc. If the temperature is higher this may increase to a value of 0.13 per cent, before zinc-iron alloy crystals will settle out. When this solution of molten zinc as galvanizing bath up to the saturation point of the zinc with iron is studied under the microscope, no dross crystals can be recognized. However, this solution of zinc and iron has a very different appearance than the zinc alone. It takes on a lighter look as can be plainly seen in PLATE 5 in the light area in the middle. When a galvanizing bath becomes completely saturated with iron in solution, the whole bath has the appearance of this light area. This condition of saturation may be said to be the second stage of the system; zinc is the first; complete saturation with iron is the second. Attention here is called to two variables, namely, temperature, and saturation points from 0.10 to 0.13; the amount of iron held by the zinc varying from the low value to the high value as the temperatures rises.

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Third Stage — Formation of Zinc-Iron Alloy Crystals Below 900 Degrees F.

THE next phase is noted by the separation out of the bath of zinc-iron alloy crystals. As fresh iron is brought into the bath by the incoming production, iron from the pot, and iron from the reduction of iron salts and corrosion, the excess of iron over saturation is removed by the separation out of zinc-iron alloy crystals taking iron out of the bath. The continual removal of this incoming iron makes it possible to keep on galvanizing. Fresh zinc low in iron is put into the bath to replace the weight of the zinc and the zinc-iron alloy crystals removed as dross. It again takes a short time to again saturate the bath with iron, since the new metal added, lowers the contamination of the bath with iron. This is the way the iron goes in and out of the bath. It comes into the bath from the pot, from production, and from iron salts and corrosion, and goes out as zinc-iron alloy crystals in the form of dross.

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The Kind of Zinc-Iron Alloy Crystals, and the Way They Form

THE way the zinc-iron alloy crystals form is clearly shown in PLATE 6. The outlines, or form of the crystal forms first, and then the rest fills in. This can be plainly seen in the small diamond-shaped crystal with three sides formed, and the outlines of a number of smaller crystals to be seen inside of the large crystal. As iron is absorbed, or thrown out of solution, it builds up the crystal. The dark areas show where the zinc-iron alloy has separated out of the bath. Attention is called to the shape of the crystals, that of diamonds. This is a cross-section of the crystal which is a very long slender needle-like crystal called a rhombohedron, and crystallizing in what is known as the hexagonal system of crystallization. PLATE No. 7 shows some of these rhombohedral zinc-iron alloy (dross crystals), cut at various angles in preparing the specimen. In PLATE 8 some of the long slender zinc-iron alloy crystals lie parallel in the face of the specimen. The shorter ones are cut on a slant, and the diamond-shaped crystals indicate that the zinc-iron alloy crystals have been cut across them.

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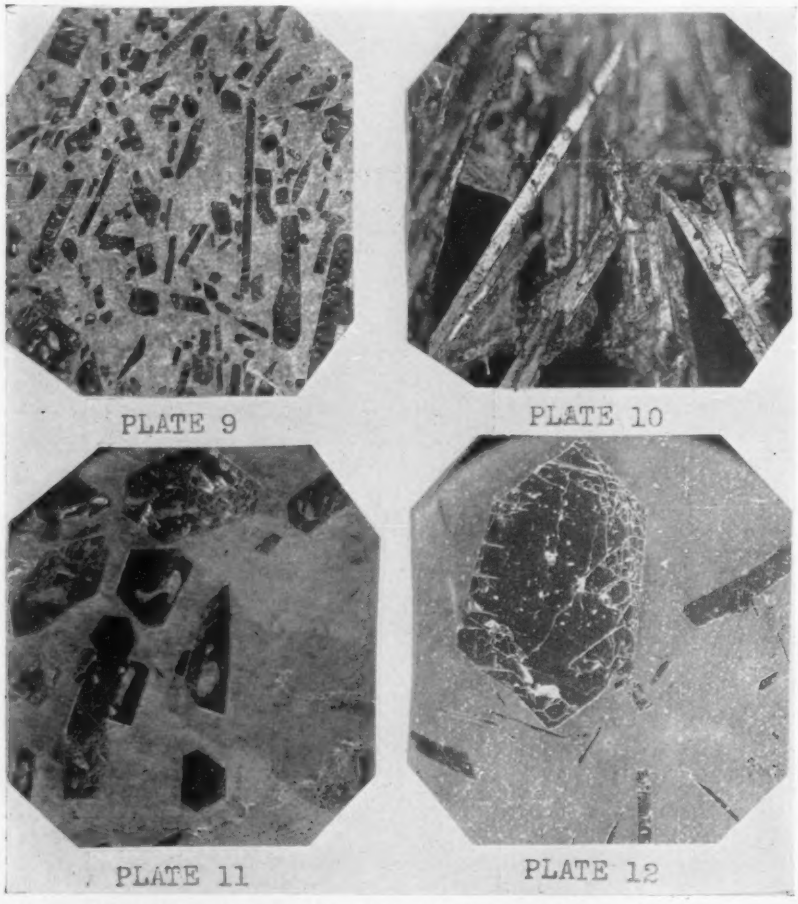
Size and Character of Zinc-Iron Alloy Crystals

THE character and the size of the crystals follow definite laws of crystallization. For example, if the conditions are such that the bath is absolutely still, then the crystals have an opportunity to grow uninterrupted, and they will be large. On the other hand if the bath is stirred up, or agitated, then the crystals do not have a chance to form, and they



9. Dross fairly high in iron. Note how big and how black the crystals are.
10. Large needle-like zinc-iron alloy crystals found at temperatures below 900 degrees F.
11. Zinc-iron alloy crystals that develop above 900 degrees F. Note they have six sides.
12. Large zinc-iron crystal at a very high temperature.

will be small. Also if the temperature is high, and the cooling range large, then again the zinc-iron alloy crystals will tend to be large. As has been stated these zinc-iron alloy crystals obey all of the laws of crystallization. Agitation in the bath, such as might be expected from work going continually through the bath in the form of production, is probably the most important single factor in affecting the size of the zinc-iron alloy crystals.

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THE character of the crystals, and by that is meant the iron content and the zinc content appears to be affected by two conditions, namely, the amount of iron present, and the temperature of the bath. The zinc-iron alloy crystals seem to take up and lose zinc much the same as other crystals take up and lose water. The amount of each component is influenced as follows—if the bath temperature remains the same, and the iron increases, then there is a chemical readjustment which permits the crystal to take up more iron in chemical combination. This would automatically therefore decrease the zinc in the crystals. On the other hand if the dross has just been removed, and a very large amount of iron taken out of the bath, and the weight of the dross has been replaced with new zinc, then there may be an adjustment in the other direction, that is the zinc-iron alloy crystals take on more zinc in chemical combination which automatically reduces the iron content of the crystals.

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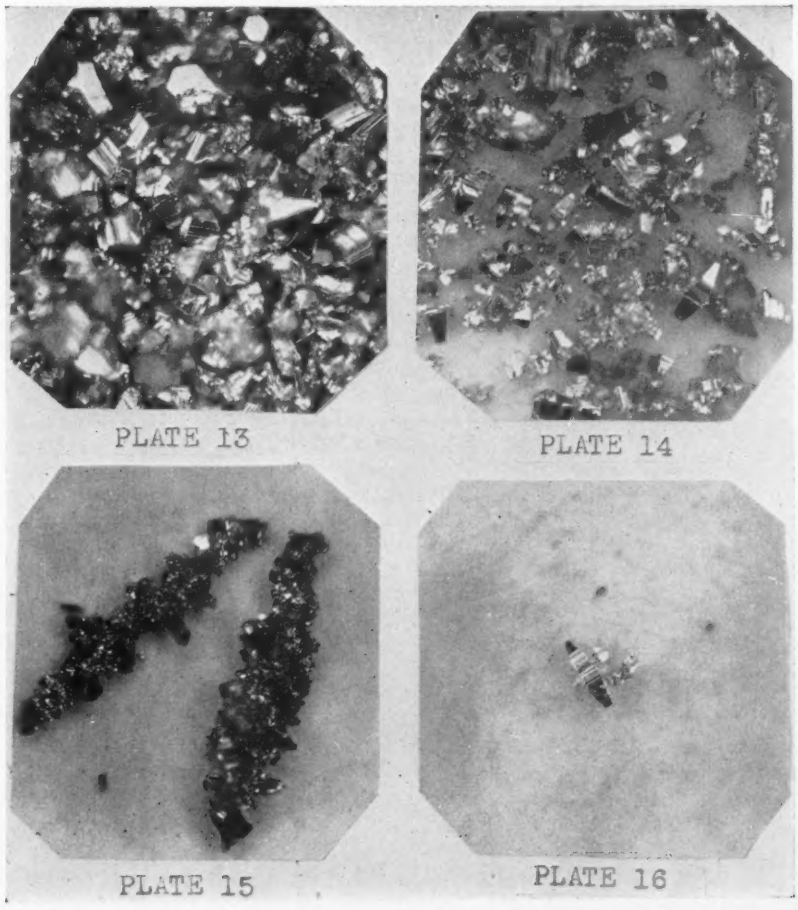
Adjustment of Variables According to Conditions

THE adjustment of all of the variables in this third phase of zinc-iron alloys depends upon conditions of bath temperature, increase or decrease of iron coming into the bath, and increase of zinc coming into the bath, such as adding new metal to the bath after drossing. As a typical example of what happens suppose that the bath temperature is increased. This automatically packs the dross tighter together, and the higher temperature releases zinc. The net result is a dross with higher iron content. As another example of change of conditions suppose the temperature remains the same, but more corrosion is bringing in a much larger amount of iron into the bath. This iron tends not only to make more dross, but also to increase the iron content of the zinc-iron alloy crystals already in the bath. Still a third example, is the large metal addition after drossing. This new metal dilutes the bath, and the zinc-iron alloy crystals tend to take on more zinc. These variables are always operating in the galvanizing bath. The temperature of the bath may be changed to suit a larger or smaller article, or the change of one article to another, may greatly increase the surface area bring in much more iron in the form of corrosion. In each case the bath and the zinc-iron alloys adjust themselves to meet the new conditions.

Iron Content of the Dross Varies With Temperature

A PRACTICAL condition of zinc-iron alloys not generally known is that the iron content of the dross varies with the temperature. When the bottom of the pot is fairly cold the iron content of the dross is low; when the bottom of the pot is hot, the iron content of the dross is high. This is brought about by two conditions, namely, less zinc between the crystals, and higher iron content in the zinc-iron alloy when the temperature is high. Just the reverse is true when the temperature is low, namely, much bath between the crystals and a high zinc content of the zinc-iron alloy crystals. Most practical galvanizers know this to be true by simply looking at the dross. Low temperature

(*Please turn to Page 408*)



13. Zinc-iron alloy crystals formed at high temperatures.
14. Zinc-iron alloy crystals formed at high temperatures. Note the pyramid forms.
15. A large mass of zinc-iron alloy crystals formed at high temperature.
16. An isolated zinc-iron alloy crystal formed at high temperature.

SLEEPER & HARTLEY, Inc.

DESIGNERS AND BUILDERS
of AUTOMATIC WIRE-WORKING MACHINERY
AND WIRE MILL EQUIPMENT
WORCESTER, MASSACHUSETTS, U. S. A.

General Bulletin *(See Note Below)* *June, 1941*

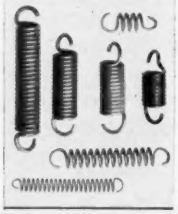
"THE MACHINES THAT PUT THE 'RINGS' IN SPRINGS"

UNIVERSAL SPRING COILING MACHINES are built in various sizes, handling cold oil-tempered wire from .004" to ⅝" diameter. Produce an extraordinary variety of spring forms (a few of which are seen at the right) at high speeds. The machines are offered in various types, all of which automatically close and square the end coils as desired. Bulletins of all sizes are available upon request. Please send specifications of your requirements.

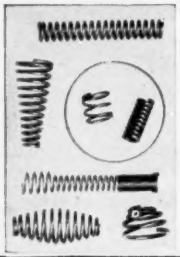
SPRING HOOKING MACHINES for forming loops and hooks in various styles on the ends of springs are offered in four sizes. See Bulletin No. 277. Machines easily and rapidly changed over, and will maintain these adjustments and produce accurately hooked springs at speeds limited only by the skill of the operator.

MACHINES for producing **TORSION SPRING** forms as shown at the right are made of five different sizes having a total wire range from No. 29 wire to ⅜" wire. These machines may be readily changed over from one spring form to another with small tool charge.
Attachments are available to form some ends.

FOR THE PRODUCTION OF BED HELICALS upon a tonnage basis, the equipment described in our Bulletin No. 252 and 268 (which comprises a Coiler, and a Cutting and Hooking Machine to be operated by one attendant), has become the standard of the world. These machines normally produce three to four thousand pounds of springs per ten hours depending upon the wire size and length.



UNIVERSAL SPRING COILING MACHINES — SELECTIVE TYPE have been developed to meet the demand for a modern machine with a wide range of wire feed. Combining the accuracy of the Segment Type Coiler, with the range of the Clutch Type Coiler and incorporating a quick change gear box, this type of machine is proving an ideal machine for the manufacturer having a wide range of spring lengths.



Note: This is page #1 of our new 4-page Bulletin. Your copy is ready.

Inspection of Army Materiel

By Lieut. Col. Scott B. Ritchie, U. S. A.,
Director of Laboratory, Ordnance Dept., U. S. Army,
Watertown Arsenal, Mass.

This is an address delivered before The Wire Association at its Annual Regional Meeting, William Penn Hotel, Pittsburgh, Pa., April 17, 1941. ✦ ✦

The statements and opinions contained therein are to be understood as individual expressions of the author and not those of the Ordnance Department. ✦ ✦ ✦ ✦ ✦

Members of the Wire Association

I FEEL greatly honored in being privileged to address you on a subject vital to national defense. Never in our history has prompt and adequate inspection of munitions assumed greater significance than it has today. I say this because inspection—**intelligent** and **effective** inspection—is one of the secrets of satisfactory and timely production. Inspection is performed by all of the supply branches of the Army who are charged with procurement of military materiel. It covers raw materials, semi-finished, and finished products — items ranging from food and clothing to long range bombers and 16″ guns. The basic principles for inspection, however, are essentially the same for all of the procuring agencies, each of whom is responsible for inspection of the material which it procures. Due to the many ramifications involved in the subject, together with limitations of time and your patience, my remarks will be confined mainly to the broad aspects of inspection as carried out by the Ordnance Department.

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THE Chief of Ordnance by law is responsible for the design, development, procurement, inspection, issue and maintenance of all Ordnance equipment. This includes some twelve hundred separate major items and approximately two hundred and fifty thousand principal components. This equipment covers such items as cannon and their mounts, railway artillery from 8″ to 14″ in caliber, rifles, pistols and all types of machine guns, all kinds of fire control equipment, including remote control mechanisms, directors, quadrants, telescopes and fuze setters, a variety of bombs and bomb fuzes, pyrotechnics, all types of small arms and artillery ammunition, including powders and high explosives, aircraft armament and automatic cannon, and armored automotive vehicles, including scout cars, light tanks, medium tanks, and heavy tanks, which go to make the long list of fighting tools for a modern army.

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WE are faced, however, not only with the necessity for a **wide variety** of fighting machines, but also with the production of **huge quantities** in the very shortest time possible. We need only to glance at Europe today to see that nations without proper military tools in over-whelming quantities are powerless to resist and that **time,** as always, is of the essence in war.

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THE magnitude of the procurement problem, which includes **inspection,** may be illustrated by an examination of recent annual increases of appropriations for the Ordnance Department which also are indicative of the interest or apprehension of the American people in national defense. From 1920 to 1938 the average appropriation to the Chief of Ordnance was approximately twelve million dollars annually. In 1938 the appropriation jumped from twelve million to fifty millions; and in 1939, it was one hundred and thirty million. Then, last September, the stupendous sum of two billion dollars was made available to the Chief of Ordnance for fighting equipment and the Lease Lend Bill now adds more. Where the end will be no one knows.

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FORTUNATELY, the Ordnance Department has been planning for just such eventualities for many years and is in position to assume this tremendous load in good order. It is to be noted that only about 5% of the actual production of munitions can be handled by the six regular manufacturing arsenals. The balance of this great production problem must fall upon American industry. The **industrial mobilization plans,** prepared by the War Department in accordance with the mandate of Congress as written into the National Defense Act of 1920, are now demonstrating their inestimable value in the solution of this problem.

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District System for Procurement

FOR example, to obviate the trouble from over-centralization in Washington, which resulted in the last war, a district system for decentralization of planning and procurement activities was established by the several procuring branches of the Army. Their function was to survey industrial facilities in time of peace to ascer-

tain where and how war-time requirements for munitions could be met. They were also to expand into procuring agencies in time of stress, one of their main functions being **inspection** of **materiel.** Thanks to the work the districts have done, the Ordnance Department today knows where and how to procure the stupendous quantities of munitions required and to distribute this load most effectively over industry.

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IN addition to knowing **where** to obtain the materials, procurement of military supplies involves several other basic considerations:

1. Requirements—what is wanted and how much.

2. Adequate specifications, including drawings, to describe clearly and accurately the items to be procured.

3. Appropriate contractual arrangements.

4. Proper inspection to insure that the material called for in the contract meets the specific requirements.

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NOW, although I have listed inspection fourth in these essential steps in procurement, it must be realized that it is one of the most important considerations. The Ordnance Department has **always** regarded the problem of inspection as paramount. The matter of securing adequate inspection of munitions in a major program is classed along with such bottlenecks as skilled labor, strategic and critical materials and machine tools.

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Reasons for Adequate Inspection

INSPECTION, of course, is done to insure that the contractor has met faithfully the conditions of his contract; but it has even a more fundamental purpose than the checking of the product for strict compliance with contractual obligations. It involves **performance, dependability, interchangeability** and **safety** in service so necessary in this age of mechanization. Everything is being speeded up for the reduction of time and space. Armies reflect the civilization in which they live and are likewise being speeded up with the result that modern warfare is largely an engineering matter. The importance of high quality and dependability cannot be overemphasized in this day when greater and greater reliance is being placed upon machines.

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UNLESS these weapons perform properly, they may be worse than useless. Faulty ammunition may cause a premature burst of a high explosive shell resulting in not only the destruction of the gun but also in the death or injury of the gun crew with its disastrous effects on morale. In the last war premature bursts of shell ran as high as 10%. At one time, out of approximately 6000 guns on the French front 750 premature explosions were reported which were traceable directly to poor quality. From this it is obvious why we must have sound steel in the body of our high explosive shells and why the explosives themselves, together with the delicate fuze mechanisms, must function safely in handling and under the shock of firing. A shell—or a bomb—is made to do certain work at the target. All the time and energy involved in placing it there may be lost if any one of the many parts in the assembly fail to function properly at the crucial time. A slight variance in the required properties of a wire spring may cause a dud.

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LACK of interchangeability of parts from improper gaging may cause failure in the maintenance of tanks in battle. Army inspection may to some appear to be severe. The reason is that our soldiers must have fighting equipment which is safe and dependable in action—the best that can be provided under the present state of arts and sciences.

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SOME 95% of the items involved, many of which are very complex and noncommercial in character, must be made by industry normally unfamiliar with these products, the manufacturing methods of which in many cases are entirely dissimilar to those used under peacetime production. This condition again emphasizes the importance of adequate, timely and expeditious inspection in the manufacture of munitions. It should reduce to a minimum irrecoverable hours of machines and labor. It is a powerful and vital factor in successful manufacture.

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Specifications Govern Inspections

AS I have already stated, the specific functions of inspection are to insure compliance with the contract, the drawings and the specifications. The governing paper, of course, is the contract itself. In case of conflict, the contract, drawings, detailed specifications and general specifications take precedence in the order given. In preparing specifications, it is kept in mind that they must be usable in an emergency. This calls for the incorporation of **commercial** compositions, tolerances, designs and processes set up by industry whenever possible and practicable to do so. The specifications and requirements established by the A.S.T.M., A.S.A., S.A.E. and similar societies are used as guides in selecting materials and preparing specifications. These, naturally, have to be adapted to meet the conditions imposed by governmental purchasing practices. The specification is the inspector's guide and, of course, must be definite and complete.

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MATERIAL is procured under both Army specifications and Federal specifications, but never is a specification of this kind prepared without the advice or consultation with representatives of industry. It is a basic principle also, in the preparation of drawings which are part of specifications, to prescribe standard commercial parts whenever they can be used, with tolerances as wide as is consistent with **interchangeability** and the final overall accuracy of the weapon being designed. Particular attention is paid to tolerances to insure that they are not impracticable in the process of manufacture. This, together, with the use, in so far as possible, of uniform and common standards, should tend to ease the inspection problem.

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IMPORTANT metal specifications are referred to our Metallurgical Advisory Board which heads up at Watertown Arsenal,

and which consists of outstanding men representative of the various industries. This Board also has representation from the Bureau of Standards, the Navy Department and the War Department. It now functions as a policy unit for advice on metallurgical problems confronting the Ordnance Department, and its operating activities have been extended to cover the various classes of material in detail by the creation of **subcommittees.** There are some seventy outstanding industrial concerns represented, comprising approximately 75% of the production capacity of the steel industry. These groups advise in connection with development research, and questions of supply, and are particularly interested in specifications. The value of the services they render cannot be overemphasized.

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WE have noted briefly the matter of contracts, drawings and specifications, and the fact that inspection is vital. It seems in order to examine the system whereby inspection of Ordnance materiel is effected. There are two main sets of Ordnance agencies involved, namely, the **Arsenals** and the **Districts.**

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The Arsenals and Districts

IN normal peacetime, the great bulk of Ordnance material is manufactured in the six regular arsenals. These, as you probably know, are Frankford Arsenal at Philadelphia, Pa., Picatinny at Dover, N. J., Rock Island at Rock Island, Ill., Springfield Armory at Springfield, Mass., Watervliet at Watervliet, N. Y., and Watertown at Watertown, Mass. Their main functions have been, in the past, to keep alive the art, to act as research and development centers, to iron out production difficulties on pilot items, to establish standards and **to train inspectors.** They, in addition, now have become important production units. In each arsenal there is an inspection organization with an Ordnance Officer at the head and trained civilian inspectors under him. The arsenals, of course, procure by contract much material from industry. This may be inspected by arsenal inspectors or by inspectors in the Ordnance Districts, of which there are thirteen, with offices in the principle industrial centers of the country. There is one here in Pittsburgh, presently located in the Chamber of Commerce Building. In this way the country is divided geographically for war planning in peacetime and for actual procurement in war time.

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IN fact, the Ordnance Districts are now actively engaged in procurement. For example, the Pittsburgh District has at present major contracts totalling approximately $91,000,000. This figure does not include subcontracts. It is estimated that the total current value of material being procured for the Ordnance Department in this district is around $125,000,000. This load may approach a half billion by the end of the current calendar year. To handle the inspection of current orders, the Pittsburgh District employs about 300 civilian inspectors whose work is directed by twelve commissioned officers. If the load is increased as estimated, this district may require the services of not less than 700 inspectors by the end of the year.

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Inspection Organization

INSPECTION is one of the most important of the district functions and an organization is maintained in each of the District Offices for that purpose. This organization is generally headed by an officer, and is quite similar to the inspection organization in the arsenals. It is realized, of course, that the inspection must cover a great variety of items. For example, in one district these would include leather, textiles, powder, machinery, machined products, shells, shell casings, artillery, including gun forgings and gun carriages, fuzes, boosters, miscellaneous forgings, and castings, stampings, wire, and bar stock. To handle this work the district inspection force may have two subdivisions; namely, **Traveling Inspectors,** who visit plants on a day-to-day basis varying in length from one hour to eight hours, and **Resident Inspectors,** who are stationed at the plant.

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THE kinds of inspection, of course, also vary with products being procured. For such mechanisms as guns, tanks and ammunition, inspection would involve among other things:

a. Chemical analyses, for composition of the metal.

b. Macroetch for grain structure, showing such things as dendrites, direction and amount of forging, laminations, segregations, porosity and cracks.

c. Physical property tests to show elastic and tensile strength, ductility and hardness.

d. Metallographic examinations.

e. Tests for ferro-magnetism.

f. Magnetic powder tests or magnaflux to detect surface imperfections of various sorts, and to a limited extent subsurface defects. This is now used extensively to test rough castings, and weldments. Defects as deep as 1/8" below the surface are now being detected.

g. Surface finish test to determine the micro inch measurements, the smoothness of surface finishes, especially applicable to bearing surfaces and recuperator cylinders.

h. Radiographic tests, X-ray and Gamma-ray, to detect subsurface conditions of soundness.

i. Corrosion, paint, plating and insulation tests.

and, of course,

j. GAGING for physical dimensions.

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IN addition to these, there are various performance tests which are made to determine the proper functioning of each component and of the completely assembled mechanism. In the manufacture of armor, actual ballistic performance tests are required both for resistance to penetration and for resistance to shock under repeated and rapid impact. Performance tests are in many cases carried out at the proving ground which may or may not be adjacent to the manufacturing facility.

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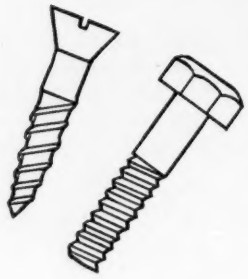
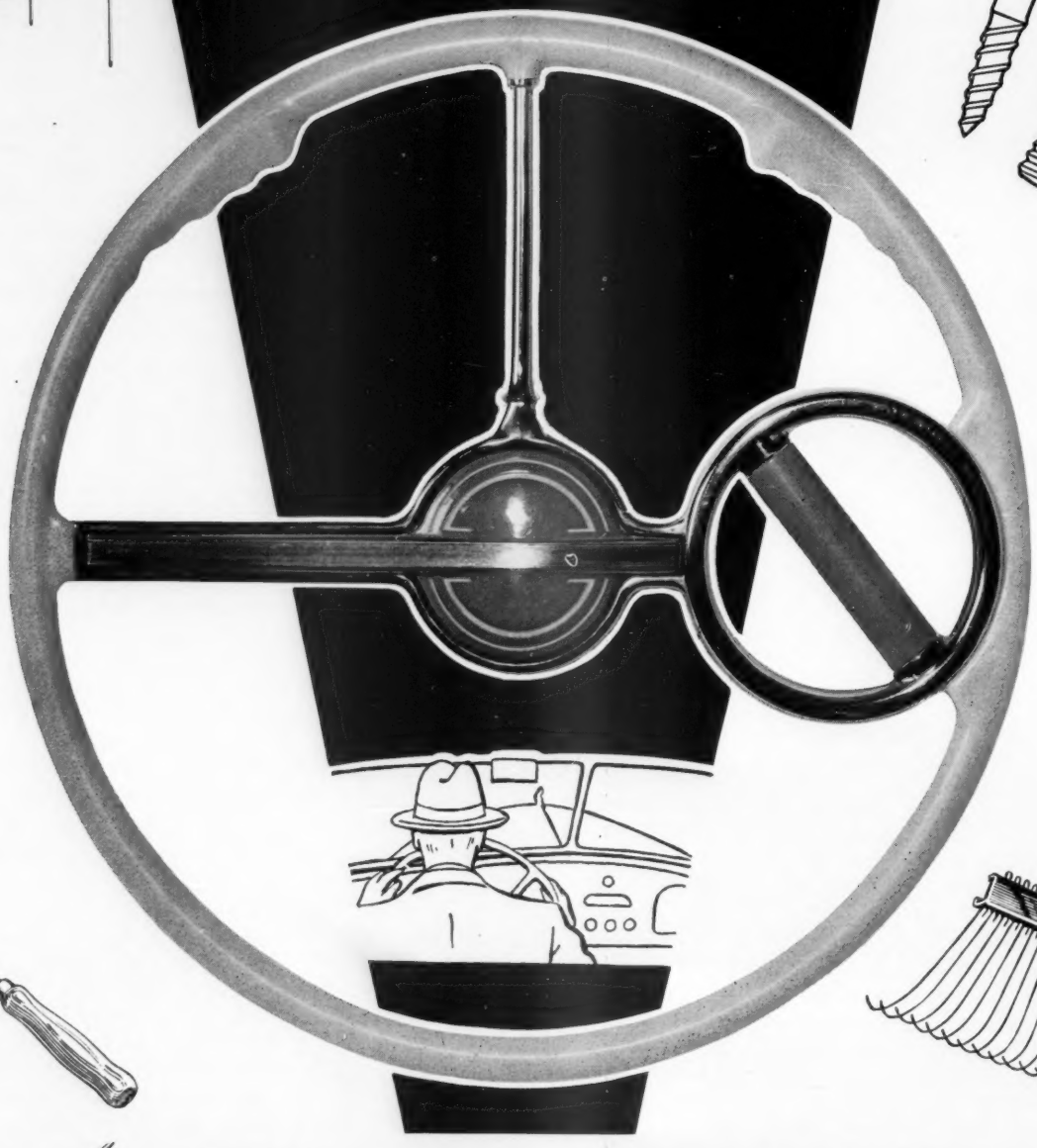
The Army Inspector of Ordnance

LET us examine now one of the most important elements in the whole inspection system, namely, the Army Inspector of Ordnance, to see what he is and how he functions. We will also consider later some of the inspection tools at his disposal by which the material is checked to insure compliance with the specifications. He is one of the most important links between industry and the Ordnance Department and is a vital

(*Please turn to Page 400*)





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In the core of a steering wheel, the teeth of a garden hoe, a screw, a bolt—in these and hundreds of other products you will find Continental SUPERIOR Wire. Continental produces wire in sizes from 34 gauge to 5/8-inch rods . . . in standard and many special shapes . . . and in a wide range of finishes to serve almost any manufacturing need.

If you have a special problem requiring wire in special shapes or wire possessing special fabricating qualities, Continental's experience as a manufacturer of wire for more than a thousand uses will be helpful to you. Write or wire today for complete information.

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CONTINENTAL STEEL CORPORATION

SHEETS: Black, Galvanized, Copperior, Hot and

WIRE: Bright Basic, Annealed, KONIK, Cop-

Steel And Metals In Relation To National Defense

By Frederick A. Westphal,
Superintendent, Wire Mills,
Sheffield Steel Co., Kansas City, Mo.

A radio address delivered over station KCKN, Kansas City, Mo., June 1, 1941, to aid in developing a spirit of national unity. ✦ ✦ ✦

HISTORY shows that nations that achieve superiority in the manufacture of metals and in the conception and production of superior weapons of war take supremacy providing the mental, physical and moral fibre of its people is strong and that they are intelligent, tough and hard working and courageous.

✦ ✦ ✦

FOR example, the Spanish Empire ruled supreme for a number of centuries. They led the world in constructing weapons of war and ships, and when they descended upon new lands they easily conquered the bow and arrow and slingshot warriors. Spain at that time led the world as articifers of metals from their foundries, most of which were bronze and iron products as steel had not yet been invented. This Western Hemisphere has a preponderance of Spanish influence as can be seen when we consider that most of South America and many large islands as well as Mexico and many of the Southern States of our country originally were claimed by Spain. Four hundred years ago—1541—this state of Kansas was explored by Coronado.

✦ ✦ ✦

GRADUALLY Spain became drunk with power and prestige; its people had been overwhelmingly victorious; they became wealthy and lived in luxury with serfs to wait on them; they were becoming **decadent** and **fat** and **soft**; they considered the hard work of metal making too great a task for their energies. In 1588 the Great Spanish Armada set out to conquer the British Isles and the greatest collection of ships of war ever known up to that time were in that Armada. Devastating storms blew them asunder and the smaller British forces fought them section by section and destroyed them. From that day the Spanish Empire was doomed. In 1898 Spain was still a first class power with vast colonial possessions and then they went to war against a second class power of that time—our own country.

✦ ✦ ✦

FREDERICK A. WESTPHAL
Superintendent of Wire Mills, Sheffield Steel Corp., Kansas City, Mo. Past President, The Wire Association
Born Holyoke, Mass., 1895. Educated U. S. Naval Academy. Four years with American Steel & Wire Co. In 1922 Assistant Superintendent Rod and Wire Works, Jones & Laughlin Steel Corp., Aliquippa, Pa. In 1928 Superintendent of Wire Mills, Sheffield Steel Corp., Kansas City, Mo. During World War served as Officer Sixth Field Artillery — severely wounded in action — twice cited and decorated for gallantry in action and meritorious services.

ADMIRALS Dewey and Schley defeated the Spanish naval fleets and Generals Shafter, Miles, MacArthur, Leonard Wood and Theodore Roosevelt defeated their armies. Spain today is rather a third class power, and a basic reason is because a few generations previously they gave up the hard work as articifers of metals. Let the historical lesson of the once Great Spanish Empire be a lesson **to our country** which today is one of the greatest first class powers.

✦ ✦ ✦

IRON products and iron wire were known to be manufactured in France in 1270, Germany in 1350, England in 1465 and in Connecticut in 1775, but it was not until about 1858 that steel was invented and developed in Europe by Bessemer, Siemans, Martin, Thiel and Wellman and definitely simultaneously by an American named Kelly in Johnstown, Pennsylvania. Great and vast developments and improvements have taken place in these eighty years, and frankly the future demands progressive improvements over what is being done today.

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TODAY the world capacity is 190 million tons of steel ingots per year for making finished products. Our country leads all with 80 million tons per year. Germany with the conquered tonnages of Czechoslovakia, Luxembourg, Belgium and France is second with 48 million tons per year; Russia is third with 22 million tons; Great Britain is fourth with 15 million tons. Lining up the democratic nations of our country and the British Empire

including Canada, Australia and India, we have 110 million tons per year against 50 million tons per year of the totalitarian powers, including the aforementioned German tonnage, with Italy, Spain and Japan.

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WITH steel and metals aligned against one another, and Russia on the side lines, the democracies have two to one against the totalitarian governments, which is encouraging, but the great elements that enter into this battle of steel capacities is **cooperation, coordination** and **efficiency.**

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IN the steel industry in relation to National Defense, let us consider the **strong chain** of American institutions, industries and resources that make up our national life. There is the government (combining Federal, State, County and municipal agencies), capital, labor, the farmer, war and navy departments, aviation, utilities, transportation, natural resources, Steel industry, non-ferrous metals industries, food industries, scientific engineering and medical professions, all allied manufacturing industries (small and large) and numerous others. **Take the perspective that these all make up a strong chain for our existence and national defense. Realize that a chain is as strong as its weakest link, therefore, let one link weaken and our American way of life is endangered.**

✦ ✦ ✦

IT has been my pleasure and opportunity to be diligently working in the steel industry for more than twenty years. My start was at the bottom and I've worked with nearly all races and creeds—those that I missed, I saw in the World War. Furthermore, I've observed the many leaders of our American steel industry and those directly or indirectly concerned with it, and they truly represent the rugged, hard-working, forthright and patriotic America. They are part of what makes America great! I will take the responsibility as a subordinate of this great industry to say that we are ready and have been ready to produce for national defense with highest quality of specified product, and do it with **hearty cooperation.** I think **coordination** and **efficiency** has most always been up-to-date in the steel industry. A definite and well scheduled plan for national defense can be ably executed, but it must be thoroughly understood that no curtailment of operations by outside influences can be tolerated to reach our goal in the steel industry or **any link of our American chain** of national defense.

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TODAY the press and radio report that our production schedules on National Defense are lagging. There is a lot of muddling! On May 15th the Army Ordnance Bulletin stated, I quote: —"Reports are that investigation of defense-plant strikes has revealed fully 50 percent of them have been secretly started by Communists. Reports also show 98 percent of America's labor is loyal, but that "action groups" plan a general strike to cripple the industrial-preparedness program."

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NOW 2 per cent is a lot! By a carefully laid plan by scientific, engineer and master minded "action groups," our national defense projects can be crippled and delayed by the smallest fraction, yes, by an infinitesimal fraction of one percent of our total production.

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TODAY and from here out, we must raise the cry **"America above all other considerations."** Our national security and ideals that our forebears established must be maintained. Our national spirit must be aggressive and militant. We must unite in defending our country at whatever means it takes to do the job!

THE ANNUAL MEDAL AWARD

OF THE

WIRE ASSOCIATION

FOR THE MOST MERITORIOUS PAPER ON

WIRE MANUFACTURE OR FABRICATION DURING THE YEAR

ALL members of the Wire Association are cordially invited to submit technical papers either for publication in "WIRE & WIRE PRODUCTS" during the year or for presentation before the Annual Wire Association Meeting at Philadelphia, October 20-24, 1941.

FOR 1941 and subsequent years a medal will be awarded in each of the two major divisions of the activities of the Association, to the papers coming nearest to the requirement set forth above.

CONSIDERATION for the Medal Awards is not limited to the papers presented at the Annual Meeting, but is given to all papers submitted by members and published in "WIRE & WIRE PRODUCTS" during the year.

SELECTION of papers to be presented at the Annual Convention rests in the hands of the Joint Program Committee of the Wire Association.

ALL papers submitted become the property of the Wire Association, and the Board of Directors constitutes the Committee on Awards.

ADDITIONAL information may be obtained by addressing:

RICHARD E. BROWN,
SECRETARY, THE WIRE ASSOCIATION

STAMFORD TRUST CO. BLDG. STAMFORD, CONNECTICUT

Why Supervision Is Essential

By Thomas W. Fazakerley,
West Wickham,
Kent, England

In this article consideration is given to the problem of departmental supervision from the British viewpoint. The problem is by no means a new one but the paper has been written in the belief that the closest co-operation between executives and operatives through the intermediary of departmental foremen and supervisors is necessary to successful plant operation. ✦ ✦ ✦ ✦ ✦

IT has been only with the advent of the comparatively recent years that supervision in factories has come to be other than a matter of secondary importance. The appointment of a departmental supervisor was frequently a promotion governed by personal acquaintanceship and was made irrespective of the particular abilities of the individual to fill the post. In those days, the value of supervision was not appreciated in its entirety whereas today, executives and managements do appreciate departmental supervision and demand that recognition should be reciprocated by a demonstration of functional ability.

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The General Implication of Supervision

WITHIN the confines of this article it is impossible to deal in a comprehensive manner with the manifold functions of supervision but its four principal factors will be dealt with. These four factors are:—

1. **Disciplinary control**
2. **Control of quantitative production.**
3. **Control of qualitative production.**
4. **Responsibility for statistical accuracies.**

✦ ✦ ✦

1. Disciplinary Control

DEPARTMENTAL supervision devolves principally on the foreman appointed for that purpose and his success or otherwise will, generally speaking, be the mirror of that esteem in which he is held by those under his control. The appointment of a supervisor should be made only after the most careful investigation, firstly, into the capabilities from the productive viewpoint and secondly, with a view to assessing the general standing of the individual in the eyes of those with whom he will associate. This latter investigation may be difficult of fulfilment in the case of an outside introduction as opposed to an internal promotion but here the co-operation of psychological research will prove helpful.

✦ ✦ ✦

FOLLOWING satisfactory inquiry and subsequent appointment, the executive should hold himself in readiness to uphold his supervisor in all decisions which he may have to make on departmental disciplinary matters. The over-riding of his rulings cannot but lower his prestige among his colleagues and such a fall from grace cannot but result, in time, in a depreciation in departmental productive capabilities.

✦ ✦ ✦

THE control of labour, taken as a whole, is an ever increasing problem and it must necessarily follow that the higher the labour turnover the greater will become the volume of inefficiency. Co-operation between the official to engage staff and the sectional supervisors is earnestly recommended for whilst the latter can rarely be permitted to decide on the engagement of an applicant, it is only right that they should have some voice in the matter. Co-ordination of labour engagement and sectional labour control is of the highest possible value for it is the contiguity of one with the other that will enforce a high degree of efficiency.

✦ ✦ ✦

2. Control of Quantitative Production

THERE is no factory which manufactures wire and wire products which does not have a system of budgetary control under which each month's operations are governed by a production programme. Any hiatus between a pre-determined plan of campaign and the actual output will be brought about by departmental inefficiency which in itself must reflect the supervisionary inefficiency of the foreman.

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IN co-operation with the departmental supervisors, the office will attend to the question of the transference of personnel which may, through insuffiency of work, have become redundant. The transfers will be effected on the recommendations of the supervisors who should be well aware of the minimum labour required to attain and maintain maximum production.

✦ ✦ ✦

IN some British organizations it is permissible for contractors to make direct contact with foremen with a view to ascertaining delivery dates. It is of paramount importance that foremen are educated in the knowledge that a delivery promise, being a vital factor of sales efficiency, is one which must be respected as repetition of broken pledges gives a derogatory indication of his estimating abilities and, in time, bring discredit to the whole organization.

✦ ✦ ✦

MENTION has been made of budgetary programmes and it is as well to bear closely in mind

that consultation with the individual supervisors should not be overlooked when an operational scheme is being discussed and drawn up.

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3. Control of Qualitative Production

TODAY the direct responsibility for the quality of products lies within the laboratory but nevertheless it is advisable and desirable to have departmental interestedness in a high grade standard of output. The laboratory and the producing departments will assume responsibility for the preparation and issue of manufacturing specifications but it follows that it is the task of the supervisors to enforce adherence to those specifications.

✦ ✦ ✦

ENFORCEMENT of specification details is particularly essential when operations are conducted on a piece work basis for temptation is ready to hand for the short circuiting of instructions by the operatives in order that they reach a higher peak of quantitative production and thus higher remuneration.

✦ ✦ ✦

THE control of quality is naturally associated very closely with the control of material wastage. Respect of manufacturing specification both by operatives and supervisors is a precedent to successful operations and to the avoidance of undue wastage which is so frequently a source of substantial loss to manufacturing organizations.

✦ ✦ ✦

4. Responsibility for Statistical Accuracies

THE systems of remuneration which are in vogue today tend towards the exclusion of the supervisor from the formulation of statistics but nevertheless co-operation from those sources is required in drawing up returns. The foreman's principal function in the statistical direction will be to ensure accuracy in the returns of

a. time worked
b. units produced per individual operative

and although preparations will have been made to eliminate as far as is possible all inaccuracies there is always a possibility of carelessness in rendering a complete description of operations or in the completion of returns forms in an intelligible manner.

✦ ✦ ✦

IT is a matter for the most careful instruction to see that all supervisors are educated to understand the desirability of 100% accuracy in their departmental returns and to appreciate to the full any summaries of figures and returns which may be made to them by the office staffs or by the executives.

✦ ✦ ✦

THE days when foremen were excluded from knowledge of statistics of domestic operations no longer obtain and the majority of supervisors today enjoy the confidence of the executive to the extent of being provided with data and statistics of production which are, without doubt, their guide in determining their own and their departments' efficiency.

IT'S THE OFFICIAL HEADQUARTERS

The Wire Association

OCTOBER
20 to 24, 1941

HOTEL PHILADELPHIAN

Entirely redecorated and refurnished, including a radio in every room. Highly recommended by experienced travelers the world over for its warm hospitality; its excellent cuisine served in comfortably air-conditioned restaurants; its convenient location to the business section; and its unlimited parking facilities. *600 rooms with bath and radio from $3.00 up.*

DANIEL CRAWFORD, JR.
President and General Manager

39th and CHESTNUT STS.
PHILADELPHIA, PENNA.

COMING — THE NATIONAL METAL CONGRESS OCTOBER 20-24, 1941

and the

ANNUAL CONVENTION NUMBER OF

WIRE and WIRE PRODUCTS

Make your reservations now for advertising space in this important issue — the Eleventh Annual Convention Number.

▲ ▲ ▲

You can reach the entire wire industry through the advertising pages of WIRE & WIRE PRODUCTS — and will be telling your sales story to the responsible, key men of the Industry.

This year, more than any heretofore, industry is operating under abnormal conditions. Regular customers are not being served as fully as you would like. Industry is operating under the stress and pressure of the defense burden it has had to shoulder.

Defense work must be done, but don't ever forget that it is emergency work — not your day-in, day-out bread and butter. Therefore it is good business to remind your customers continuously that you are in business and doing your best to serve them. Your advertising under these difficult conditions will help to sell and keep your customers sold on the value of your products, equipment, supplies or services. Your present advertising will, in effect, be insuring your future.

▲ ▲ ▲

The October Issue of WIRE & WIRE PRODUCTS has top-flight qualities as an advertising medium. It contains pre-prints of the papers to be presented and discussed in the technical sessions of the Wire Association during the Convention.

It gives your advertising:

— Special Attention Value
— Extra Circulation
— Long Life
— A Punch that Pays

▲ ▲ ▲

KEEP IN TOUCH WITH YOUR MARKET— THE WIRE AND WIRE PRODUCTS INDUSTRY—

through advertising in

WIRE AND WIRE PRODUCTS

So put your best foot forward in your advertising for the October Convention Number. Write us today making your space reservations for October — or for further details.

WIRE AND WIRE PRODUCTS 300 MAIN ST., STAMFORD, CONN.

STATISTICS --- APRIL, 1941

PRODUCTION FOR SALE OF IRON AND STEEL PRODUCTS

AMERICAN IRON AND STEEL INSTITUTE
Capacity and Production for Sale of Iron and Steel Products

Period: April - 1941

		Number of companies	Items	Annual Capacity Net tons	Production for Sale—Net Tons: Current Month: Total	Current Month: Per cent of capacity	Current Month: Shipments: Export	Current Month: Shipments: To members of the industry for conversion into further finished products	Year to Date: Total	Year to Date: Per Cent of capacity	Year to Date: Shipments: Export	Year to Date: Shipments: To members of the industry for conversion into further finished products
Steel Products	Ingots, blooms, billets, slabs, sheet bars, etc.	32	1	xxxxxxxx	420,289	xxx	38,543	155,726	2,071,059	xxx	617,359	580,942
	Heavy structural shapes	8	2	5,038,200	383,469	92.5	12,758	xxxxxxxx	1,448,735	87.4	70,573	xxxxxxxx
	Steel piling	4	3	332,000	24,382	89.3	4,652	xxxxxxxx	87,223	79.9	10,921	xxxxxxxx
	Plates—Sheared and Universal	19	4	6,168,590	446,653	88.0	27,235	1,907	1,746,013	86.1	155,555	8,592
	Skelp	8	5	xxxxxxxx	96,618	xxx	15,681	38,090	349,122	xxx	50,184	147,200
	Rails—Standard (over 60 lbs.)	4	6	3,613,600	175,650	59.1	4,185	xxxxxxxx	606,776	51.1	31,389	xxxxxxxx
	Light (60 lbs. and under)	6	7	302,800	16,410	65.9	6,574	xxxxxxxx	66,996	67.3	26,838	xxxxxxxx
	All other (Incl. girder, guard, etc.)	2	8	102,000	2,021	24.1	345	xxxxxxxx	7,712	23.0	1,385	xxxxxxxx
	Splice bar and tie plates	15	9	1,300,200	71,162	66.5	1,255	xxxxxxxx	252,355	59.0	6,966	xxxxxxxx
	Bars—Merchant	35	10	xxxxxxxx	521,970	xxx	33,358	52,280	2,140,948	xxx	225,824	237,373
	Concrete reinforcing—New billet	16	11	xxxxxxxx	118,972	xxx	18,282	xxxxxxxx	455,367	xxx	77,236	xxxxxxxx
	Rerolling	17	12	xxxxxxxx	16,788	xxx	873	xxxxxxxx	45,814	xxx	3,486	xxxxxxxx
	Cold finished—Carbon	19	13	xxxxxxxx	104,619	xxx	2,195	xxxxxxxx	398,708	xxx	7,895	xxxxxxxx
	Alloy—Hot rolled	15	14	xxxxxxxx	143,957	xxx	10,091	12,310	538,642	xxx	49,696	51,035
	Cold finished	15	15	xxxxxxxx	15,955	xxx	2,117	xxxxxxxx	57,251	xxx	7,373	xxxxxxxx
	Hoops and baling bands	5	16	xxxxxxxx	8,787	xxx	636	xxxxxxxx	32,637	xxx	1,456	xxxxxxxx
	TOTAL BARS	52	17	12,194,785	931,048	92.8	67,552	64,590	3,669,367	91.5	372,966	288,408
	Tool steel bars (rolled and forged)	15	18	127,870	10,319	98.1	607	xxxxxxxx	35,751	85.0	2,781	xxxxxxxx
	Pipe and tube—B. W.	13	19	2,049,200	134,153	79.6	13,199	xxxxxxxx	505,712	75.0	38,626	xxxxxxxx
	L. W.	8	20	885,260	41,101	56.4	4,615	xxxxxxxx	155,993	53.6	10,994	xxxxxxxx
	Electric weld	4	21	462,520	36,963	97.1	1,926	xxxxxxxx	129,450	85.1	3,389	xxxxxxxx
	Seamless	15	22	3,105,440	189,623	74.2	15,678	xxxxxxxx	696,111	68.1	63,921	xxxxxxxx
	Conduit	6	23	152,145	11,541	92.2	267	xxxxxxxx	44,162	88.2	671	xxxxxxxx
	Mechanical Tubing	12	24	467,725	39,706	103.2	3,267	xxxxxxxx	152,124	98.9	16,066	xxxxxxxx
	Wire rods	18	25	xxxxxxxx	128,377	xxx	10,473	24,021	510,251	xxx	57,798	87,667
	Wire—Drawn	36	26	2,291,250	177,910	94.4	13,777	1,863	704,269	93.4	52,241	7,534
	Nails and staples	19	27	1,120,610	69,702	75.6	6,646	xxxxxxxx	278,417	75.5	22,382	xxxxxxxx
	Barbed and twisted	16	28	458,210	24,385	64.7	5,836	xxxxxxxx	94,938	63.0	20,995	xxxxxxxx
	Woven wire fence	15	29	771,180	28,993	45.7	123	xxxxxxxx	111,739	44.1	811	xxxxxxxx
	Bale ties	11	30	114,730	7,877	83.4	--	xxxxxxxx	23,553	62.4	40	xxxxxxxx
	All other wire products	5	31	24,280	558	27.9	--	xxxxxxxx	1,996	25.0	--	xxxxxxxx
	Fence posts	14	32	136,445	6,523	58.1	145	xxxxxxxx	23,461	52.3	421	xxxxxxxx
	Black plate	11	33	341,235	34,917	124.4	2,146	--	124,208	110.7	5,163	8
	Tin plate—Hot rolled	7	34	352,700	23,541	81.1	1,897	xxxxxxxx	84,290	72.7	4,541	xxxxxxxx
	Cold reduced	10	35	3,520,640	241,697	85.4	21,659	xxxxxxxx	847,369	73.2	72,222	xxxxxxxx
	Sheets—Hot rolled	24	36	xxxxxxxx	660,525	xxx	25,578	18,866	2,573,870	xxx	112,725	76,130
	Galvanized	14	37	xxxxxxxx	154,651	xxx	10,995	xxxxxxxx	613,606	xxx	44,718	xxxxxxxx
	Cold rolled	16	38	xxxxxxxx	283,268	xxx	4,659	xxxxxxxx	1,130,467	xxx	22,645	xxxxxxxx
	All other	14	39	xxxxxxxx	68,429	xxx	1,832	xxxxxxxx	272,254	xxx	7,756	xxxxxxxx
	TOTAL SHEETS	27	40	13,154,510	1,166,873	107.8	43,064	18,866	4,590,197	106.1	187,844	76,130
	Strip—Hot rolled	23	41	3,200,380	166,930	63.4	5,234	22,620	679,638	64.6	27,818	90,254
	Cold rolled	34	42	1,385,260	103,954	91.2	1,961	xxxxxxxx	391,989	86.0	6,357	xxxxxxxx
	Wheels (car, rolled steel)	5	43	422,825	21,212	61.0	--	xxxxxxxx	83,838	60.3	151	xxxxxxxx
	Axles	4	44	472,280	15,821	40.7	228	xxxxxxxx	58,290	37.5	382	xxxxxxxx
	Track spikes	11	45	327,275	16,677	61.9	414	xxxxxxxx	58,937	54.8	1,289	xxxxxxxx
	All other	5	46	10,600	2,693	308.8	--	xxxxxxxx	6,131	175.8	79	xxxxxxxx
	TOTAL STEEL PRODUCTS	131	47	xxxxxxxx	5,269,748	xxx	331,942	327,683	20,698,172	xxx	1,941,118	1,266,735
	Pig iron, ferro manganese and spiegel	24	48	xxxxxxxx	579,988	xxx	44,107	173,258	2,549,494	xxx	178,849	765,100
	Ingot moulds	4	49	xxxxxxxx	56,665	xxx	180	xxxxxxxx	239,163	xxx	562	xxxxxxxx
Iron Products	Bars	9	50	109,195	5,366	59.7	7	344	20,070	55.9	9	1,049
	Pipe and tubes	3	51	109,300	5,301	58.9	237	xxxxxxxx	20,498	57.0	359	xxxxxxxx
	All other	2	52	71,000	1,753	30.0	414	--	6,764	29.0	1,181	--
	TOTAL IRON PRODUCTS (ITEMS 50 to 52)	11	53	224,995	12,420	67.1	658	344	47,232	64.0	1,549	1,049

Total Number of Companies Included - 148

The estimated average yield of products for sale from ingots produced by the companies included above is 71.2 *%, which applied to their total ingot capacity equals* 57,533,200 *net tons of finished rolled products. Production for sale, less shipments to members of the industry for further conversion, related to the estimated yield is as follows:*

Current month 4,942,065 *N. T.;* 104.4 *%*
Year to date 19,431,437 *N. T.;* 102.7 *%*

If You Are Not A Member Of The Wire Association—Now Is A Good Time To Join!
The Annual Dues Are $10.00 — For detailed information address
RICHARD E. BROWN, Secretary
300 Main Street, THE WIRE ASSOCIATION Stamford, Conn.

Exports and Imports of Wire

Publication of Detailed Export Statistics Suspended

IN the interest of national and hemisphere defense, the Department of Commerce has decided to cease publishing detailed statistics concerning the country of destination of our exports.

✦ ✦ ✦

THIS decision with respect to all exports has only been reached after very careful consideration by the Department. The resultant inconvenience to American exporters will be far out-weighed by the contribution which will be made to our economic defense in the present acute emergency.

✦ ✦ ✦

THE character of our foreign trade has, of course, completely altered in the past year and a half, through war, foreign exchange restrictions, import quotas, scarcity of ocean tonnage, etc. Our export trade has been channelized to such an extent that partial or fragmentary figures with respect to country of destination would prove of little help in the promotion of what remains of our commercial foreign trade, and yet could be immensely useful to forces whose activities are inimical to the interests of this country.

✦ ✦ ✦

Mexico

COMPANIA Fundidora de Fierro y Acero de Monterrey, S. A., at Monterrey, expects to overhaul and reline its blast furnace before the end of the current summer. With the thought of laying up stocks to take care of the period when the furnace will be idle, production of pig iron was pushed during the first quarter of 1941 — the output rising from 24,953 tons in the last quarter of 1940 to 28,408 tons, a gain of 13.8 percent. During the periods, however, output of ingots decreased from 32,992 tons to 23,984, or 27.3 percent. The production of finished articles for the same period fell from 32,772 tons to 26,971, a decrease of 17 per cent. Idleness of the plant for a period of 15 days because of vacations may account for some of this decrease. Production during the 3-month period of 1941 of the finished articles included commercial steel, 13,705 tons; structural steel, 5,127; rails, 1,873; rivets, bolts, nuts, and similar products, 905; wire, 2,896; grinding balls, 876.

✦ ✦ ✦

Copper Wire Plants in China

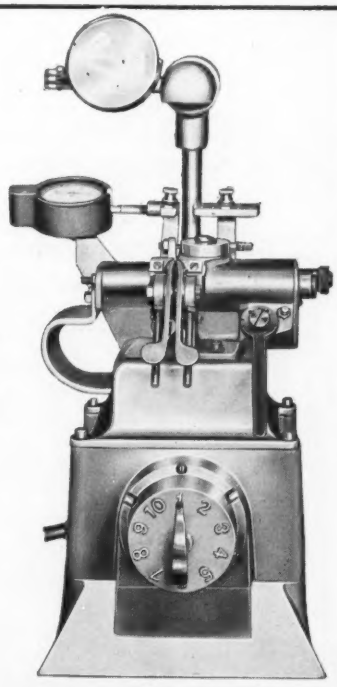
THE Chinese National Government since 1938 has erected three large plants for the manufacture of copper and iron-wire cables, vacuum gas-filled lamp bulbs, motors, generators, transformers, motor starters, switchgears, batteries, and high and low tension insulators.

MICROMETER PRECISION MICRO-WELD TRADE MARK REG. U. S. PAT. OFF.

CONTINUOUS IMPROVEMENT

MICRO-WELDERS with dial indicating annealing attachments are now available for high carbon wire.

There is positive control of annealing temperature and already hundreds of these special MICRO-WELDERS are proving their dependability and satisfactory performance with leading manufacturers.

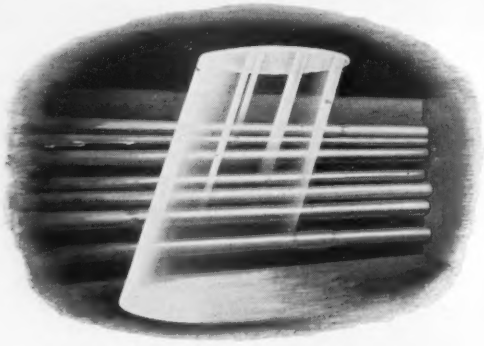


Model E.-I-S Welder Capacity .010 to .062" high & low carbon wire.

MICRO PRODUCTS COMPANY

20 NORTH WACKER DRIVE, CHICAGO, ILL.

Telephone, State 7468



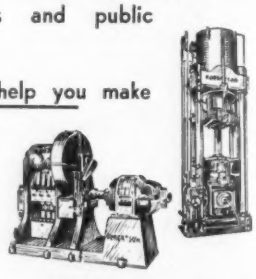
Who built this

UNDERGROUND EMPIRE ?

You helped. Directly, if you are a maker of lead sheathed electrical cable. Indirectly, in many ways, if you are a maker of some other wire products.

And, in the nation's network of tunnels laced through with current carrying cables, power surges to the shops, to the mills and the factories and the homes and the farms of a nation at work. Power that translates into vital goods and services essential to progress and public welfare.

You helped, and we help you make this possible . . . for ROBERTSON has been the pioneer in development of equipment for lead encasing electrical cables . . . and . . .



Hydraulic Press • High Pressure Hydraulic Pump

NEARLY ALL MANUFACTURERS OF LEAD ENCASED CABLES USE ROBERTSON !

CABLE LEAD ENCASING EQUIPMENT

JOHN ROBERTSON COMPANY, INC. • 125-137 WATER ST., BROOKLYN, N. Y.

— Since 1858 —

Nicaragua

IMPORTS of iron and steel products into Nicaragua rose from 3,113 metric tons in 1939 to 3,487 tons in 1940. Included in the 1940 total were 1,037 tons of wire and manufactures thereof; 1,469 tons of bars, rods, castings. plates, and sheets; 437 tons of nails and tacks; and 544 tons of pipes and accessories. The United States was the leading supplier in each instance, accounting for 1,012, 1,439, 433, and 543 tons, respectively, of the various items, according to official Nicaraguan statistics.

✦ ✦ ✦

Brazil

EXPORTS of iron ore from Brazil through the port of Rio de Janeiro in March, 1941, totaled 23,730 long tons, compared with no shipments in February and January. Stocks of iron ore at Rio held by Brazilian shippers at the close of March totaled 87,275 tons, of which A. Thun & Co., Ltd., held 11,939 tons.

✦ ✦ ✦

Inspection of Army Materiel

(*Continued from Page 391*)

factor in maintaining coöperation which is so mutually essential for fulfilling the contract. Because of the great importance of the work, and the technical skills involved, the inspector must be carefully selected and carefully trained. Whenever an expansion such as we are now facing occurs, the problem of meeting inspection personnel requirements becomes great. It is necessary to obtain men and train them. In this training program a large number of reserve officers are included to supplement the regular force.

✦ ✦ ✦

THE inspector must be capable of understanding the requirements as set up in specifications and drawings and must have skill and capacity for the patient work and the meticulous care with which every detail of inspection is performed. He must have a full appreciation of his **responsibility**, not only to his immediate superiors, but also to those who may suffer if his carelessness allows

defective material to be incorporated into mechanisms, failure of which might have disastrous consequences. He must also have **common sense**—lots of it—and he must exercise tempered judgment. He will be required to distinguish between minor defects and those that are important. He should be keenly aware of production requirements and must be capable of coöperating with shop personnel. His integrity and his loyalty to the country must be above reproach. Such ability comes partly from personality and partly from experience in actual manufacture of material of the same general character as that which he will be called upon to inspect.

✦ ✦ ✦

Requirements for Inspectors

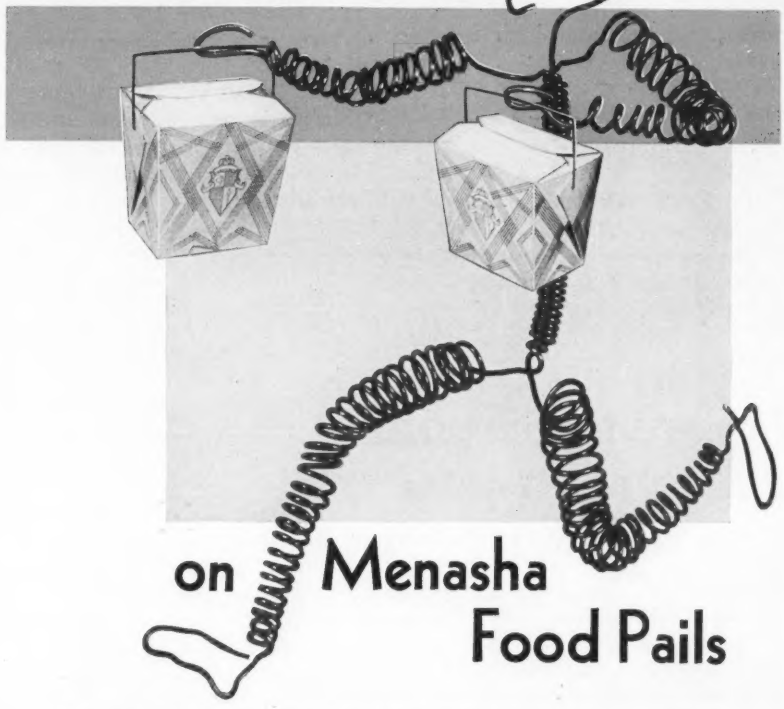
IN looking over Civil Service requirements, it is noted that a strong emphasis is placed upon experience. Educational requirements are definitely secondary. This emphasis is probably not accidental. It has been found that the men who are best qualified to inspect a given product are those who from intimate physical contact with that or similar products are best acquainted with it. It is true that the background of such men is distinctly shop experience, and that they will not in general fully appreciate the broader significance of inspection which we have already stressed. They may tend to become routine but will in most cases tend to develop high efficiency in assuring products that conform closely to specifications.

✦ ✦ ✦

ACADEMIC qualifications, however, are not neglected. In most of the inspectors' positions, college training will be accepted in lieu of some of the shop experience. For instance, in the three highest ratings for Ordnance Material Inspectors, college work may be substituted for a maximum of two years of shop inspectional experience on a basis of one successfully completed year of college work in an engineering college of recognized standing for six months of experience. That is, a college graduate could substitute his four years of college work for two of

(*Please turn to Page 402*)

Handle Wire that Handles Well



on Menasha Food Pails

When you're carrying home some bulk ice cream, or oysters, chili, kraut, or salad — it's mighty convenient to have them packed in sturdy, compact, sanitary Menasha food pails. And that carrying convenience is completed by neat wire handles . . . several hundred tons of them every year, made from Keystone wire.

Right from the "firing line," from the executive in charge of food pail production at Menasha Products Company, Menasha, Wisconsin, comes this expression: "Had I a good command of descriptive adjectives, I would be able to give Keystone wire a *substantial* boost. We have had consistently good results. The wire has been excellent in uniform caliber, finish and packaging. We haven't had a complaint of rusty handles for so long, we do not carry a file on it — such as was necessary 'way back when!"

KEYSTONE

STEEL & WIRE CO. Dept. W PEORIA, ILLINOIS

HIGH CARBON OR LOW CARBON

SAMSON SPRING WIRE

Bright-Tinned Coppered Annealed Galvanized

Inspection of Army Materiel

(*Continued from Page 401*)

the required years of experience in the three highest grades of Ordnance Material Inspector, those of Associate Inspector, Inspector, and Senior Inspector. For the grades of Junior and Assistant Inspector requiring one and two years of shop experience respectively, no substitution is permitted.

✦ ✦ ✦

THE problem of training inspection personnel is indeed a serious one. This fact has been recognized by the organization for defense and steps have been taken to meet the situation.

✦ ✦ ✦

Training Inspectors

AT the present time, inspectors are employed from available eligibles who are on Civil Service lists. These are given intensive training in courses maintained at various ordnance establishments. For instance, the newly employed inspectors, who will inspect various types of equipment similar to that manufactured at Watertown Arsenal, attend a course of instruction at the arsenal in which lectures are given on directly pertinent subjects by a faculty of instructors who are chosen from the arsenal staff, and from the faculty of Massachusetts Institute of Technology. The instruction consists of practical lectures and laboratory work, most of which is taken at Watertown Arsenal in close relation to inspection of materiel in actual production. The course runs for seven weeks.

✦ ✦ ✦

IN addition to this general course, some of the men are given special training to fit them for certain fields. For instance, one special group is being given an advanced course in the inspection of welds and weldments and another in macro etchings.

✦ ✦ ✦

BESIDES the actual instruction, pamphlets for the use of inspectors have been compiled. Some of these are:

General Inspection Manual

Inspection Manual for Metals

Inspection Manual for Arc Welded Structures

Inspector's Manual for Macroetching (Macroexamination of Gun Forgings and Breechblock Forgings)

These are of great help as guides, but are not part of specifications.

✦ ✦ ✦

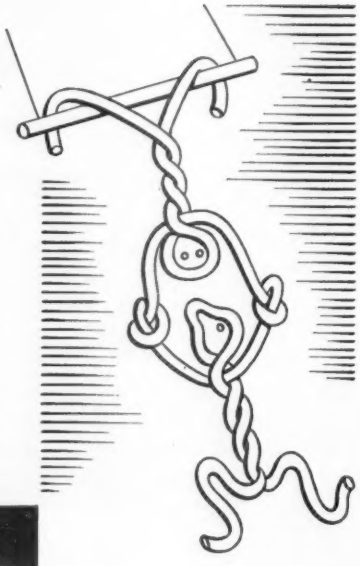
IN the courses referred to emphasis is placed upon the development of a sense of proportion. The student is not graduated unless it is fairly certain that he will distinguish between important and unimportant matters in the inspection of Ordnance. While it is intended that the inspector should develop self-reliance and confidence, we do not want him to feel **too important** or to make arbitrary decisions. He should help production rather than retard it; he should coöperate, not harass.

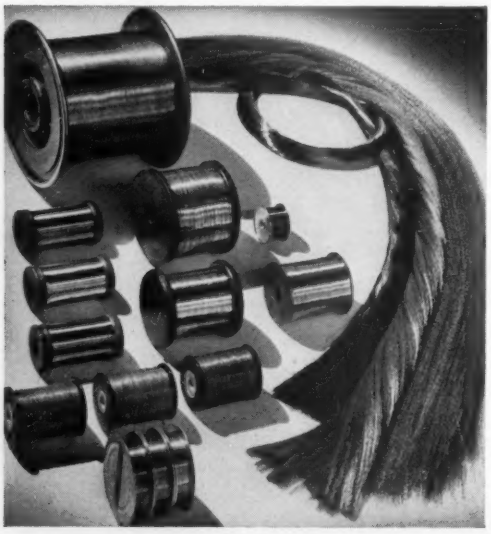
✦ ✦ ✦

I SHOULD also like to refer to the splendid work being done by the engineering schools and colleges in the refresher courses they are giving to fill the need for engineers working in the defense industries. You probably recall that Congress appropriated funds for this purpose to be expended

"UNUSUAL" FINE WIRE PERFORMANCE IS USUAL TO CALLITE

Wire tolerance to less than one ten thousandth of an inch . . . screen wire fine enough to sift face powder . . . fine wire with prompt delivery! These are "unusual" wire problems Callite meets every day. Unusual, that is, to manufacturers. To the technical men on Callite's staff, no wire problem is unusual. They specialize in the production of wire in a wide range of types, sizes and finishes. And quality, uniformity, dependability are part of the plan. Inquiries are invited on your "unusual" fine wire problems.





Write for

COMPLETE DETAILS

Callite wires are available in aluminum, beryllium-copper, stainless steel, phosphor bronze, Everdur, brass — all grades, commercial bronze, nickel-silver alloys and special alloys in sizes down to .002", smaller in certain cases. Write for complete details.

CALLITE WIRES

CALLITE TUNGSTEN CORPORATION

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Branch Offices: Chicago, Ill. • Cleveland, O.

FINE WIRE FOR EVERY NEED — CALLITE TUNGSTEN — CT

under the supervision of the U. S. Office of Education. Some one-hundred and five courses in various phases of inspection alone, distributed through about forty-five educational institutions, have been offered. It is understood that the total enrollment, as of December 30, last, was over 36000 and has increased.

✦ ✦ ✦

IN addition to the college courses provided at the expense of the government, some national industrial societies, notably the American Society for Metals, have offered educational courses in their various chapters directly applicable to the education of inspectors. For instance, the Philadelphia Chapter sponsored a series of lectures in collaboration with Frankford Arsenal, and the Boston Chapter in collaboration with Watertown Arsenal gave a course of lectures directed primarily toward the assistance of manufacturers and their representatives.

✦ ✦ ✦

The Inspection Organization

IT is to be noted that the inspection organization contains officers as well as civilians. These officers, generally speaking, have served not only with the Ordnance Department but also with branches for whom the Ordnance Department is making equipment. They know what the using service demands and are in a position for effective liaison between the designer, the manufacturer and the user. In many ways they are creators of policy with respect to equipment rather than actual inspectors on the job.

✦ ✦ ✦

WE have discussed briefly the type of inspectors desired and the steps being taken to recruit and train them for the expanding procurement program. A word should also be said about the facilities or tools used by the inspector to do his work.

✦ ✦ ✦

A CONSIDERABLE amount of inspection is performed by the various arsenal laboratories in which are maintained competent Materials Inspectors and Chemical and Metallurgical Engineers. These laboratories also establish **standards** for inspection of certain types of material which are of great help to the Field Inspectors. I should like also to recognize here the assistance which is rendered by commercial and university laboratories in connection with the test, inspection and acceptance of materials which the Department procures.

✦ ✦ ✦

IN addition to their main laboratories, each of the six manufacturing arsenals maintains a well-equipped, constant temperature, **Gage** Laboratory. There is a Gage Laboratory also in each of the thirteen Ordnance Districts. Ten of these are located at universities and are doing exceedingly valuable work.

✦ ✦ ✦

Gages and Tools Required for Inspection

THE gage problem, although very important, has to date not been critical. With the increasing procurement load, how-

(*Please turn to Page 406*)

NEW — AND BETTER

The Trauwood PROCESS

Trauwood electrically heated tinning and galvanizing baths—heated by means of specially designed Trauwood electric heating elements.

Heaters are zoned to afford the ultimate in uniform temperature control throughout the metal bath.

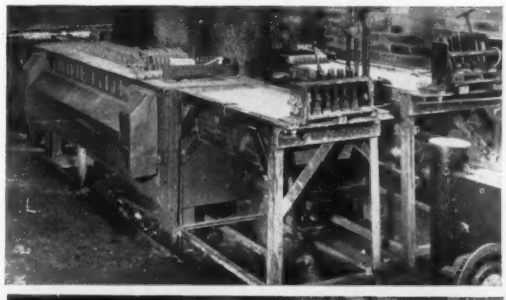
The pans last indefinitely because of the fact that there is no flame impingement.

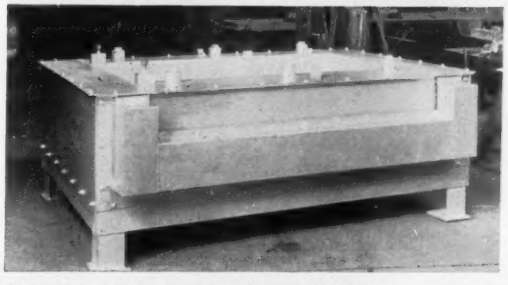
Equipment is extremely compact.

Can be built to handle any number of strands of wire or strip, in any tonnage desired.

Complete details of the Trauwood Process will be furnished you on request. Our engineers will help you solve your continuous wire and strip patenting, tempering, annealing, tinning, and galvanizing problems. Write today.

TIN and ZINC COATING





THE TRAUWOOD ENGINEERING COMPANY

1740 E. 23rd STREET, CLEVELAND, OHIO, U. S. A.

A Review of Recent Wire Patents

No. 2,240,579, FLEXIBLE CONDUCTOR, patented May 6, 1941 by Earle E. Schumacher, Maplewood, and Alexander G. Souden, Jersey City, N. J., assignors to Bell Telephone Laboratories, Incorporated, New York, N. Y., a corporation of New York.

A tinsel thread for electrical conductors is provided consisting of a textile core member having a metallic ribbon helically wound thereupon composed of a copper-beryllium alloy consisting of from 1⅛ to 1½ per cent beryllium and the balance copper and having a conductivity not less than 30 per cent that of pure copper.

✦ ✦ ✦

No. 2,240,745, ELECTRIC CABLE, patented May 6, 1941 by Ralph W. Atkinson, Perth Amboy, N. J., assignor to General Cable Corporation, New York, N. Y., a corporation of New Jersey.

This nineteen-claim patent is for a high tension electric cable of the type having an expansible and contractible sheath to accommodate for changes in the volume of the conductor and insulation.

✦ ✦ ✦

No. 2,240,872, SPRING AND AIR CUSHION, patented May 6, 1941 by Maurice Stubnitz, Adrian, Mich., assignor to Stubnitz-Greene Spring Corporation, Adrian, Mich., a corporation of Michigan.

The wire springs cooperate to hold the air cushion closures against vertical displacement.

Complete Descriptions and Drawings of Patents May Be Had for 25 cents. Address, Wire & Wire Products, 300 Main St., Stamford, Conn.

✦ ✦ ✦

No. 2,241,039, MATTRESS CONSTRUCTION, patented May 6, 1941 by Norman D. Mattison, Montclair, N. J.

This mattress has the usual cover and layers of padding inside the cover on both sides of the mattress, springs between the layers of padding, and auxiliary springs within the first mentioned springs to augment the resistance of these first mentioned springs when the latter have been subjected to a definite degree of compression, the resistance offered by the auxiliary springs being different in different areas of the mattress.

✦ ✦ ✦

No. 2,241,387, SPRING AND METHOD OF MAKING THE SAME, patented May 13, 1941 by Alfred J. Berg, Portsmouth, N. H., and John O. Huse, United States Navy.

A cut spring is provided comprising an integral metallic portion, being formed by cutting operation and cold worked by the cutting.

✦ ✦ ✦

No. 2,241,388, SPRING AND METHOD OF MAKING THE SAME, patented May 13, 1941 by Alfred J. Berg, Portsmouth, N. H., and John O. Huse, United States Navy.

In this patent the integral metallic member has a flange extending along an edge thereof with the entire lateral surfaces of the member being formed by a cutting operation and cold worked by the cutting.

✦ ✦ ✦

No. 2,241,955, METALLIC ROPE AND CABLE, patented May 13, 1941 by Alvin L. Noyer and Alexander McEachern, Portland, Oregon, assignors to Wickwire Spencer Steel Company, New York, N. Y., a corporation of Delaware.

The assembly includes a central core with a number of wire strands surrounding it. Means is provided for preventing the adjacent sides of the strands from contacting each other.

✦ ✦ ✦

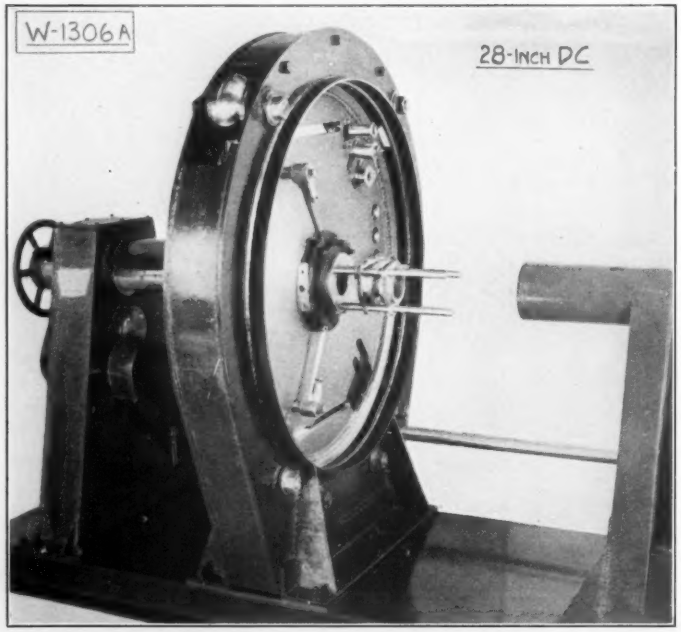
No. 2,241,956, WIRE DRAWING MECHANISM, patented May 13, 1941 by Norman H. Nye, Cuyahoga Falls, Ohio, assignor to The Vaughn Machinery Company, Cuyahoga Falls, Ohio, a corporation of Ohio.

A hollow rotatable block is provided, adapted to have the wire wound thereon, the block having passageways therein adapted to conduct a fluid cooling stream in a prescribed tortuous path traversing the interior surface of the wire-contacting

THE WATSON MACHINE COMPANY

ESTABLISHED 1845

PATERSON, NEW JERSEY, U. S. A.



ALL TYPES AND SIZES OF CONCENTRIC AND ECCENTRIC TAPING EQUIPMENT.

CUT W-1306A SHOWS DOUBLE - CONCENTRIC TAPING HEAD FOR PARKWAY CABLE APPLICATION.

portion of said block both axially and circumferentially.

✦ ✦ ✦

No. 2,242,022, CABLE ARMORING MACHINE, patented May 13, 1941 by William H. Blount, Worcester, and Clayton F. Fisher, Spencer, Mass., assignors to Sleeper & Hartley, Incorporated, Worcester, Mass., a corporation of Massachusetts.

This machine comprises a rotatable head, means for holding a supply of separate wires on the head, means for rotating the head and means for moving the cable forward and simultaneously drawing the wires from the rotating head without rotating the cable whereby the wires are twisted together, means for wrapping and interlocking an armoring strip about the non-rotating twisted wires and forming a flexible cable, means for measuring a predetermined length of the moving cable, means for cutting off said length without stopping the cable and means for synchronizing the operations of the said means.

✦ ✦ ✦

No. 2,242,024, MACHINE FOR REMOVING SCALE FROM RODS, patented May 13, 1941 by Paul W. Dillon, Sterling Ill., assignor to Northwestern Steel and Wire Company, Sterling, Ill., a corporation of Illinois.

In this descaling machine, groups of sheaves are mounted in planes at an angle to each other with sheaves of said groups having spaced apart peripheral teeth extending across the width thereof and having aligned central recesses defining a rod receiving peripheral groove around the sheave, at least one toothed sheave of each group having the teeth thereof in angular relation to its rotational axis, and at least one sheave of each group being adjustable in the mounted plane thereof to bend the rod a desired amount in such plane.

✦ ✦ ✦

No. 2,242,164, CHAIN MAKING MACHINE, patented May 13, 1941 by George E. Barstow, Lakeville, Mass.

For manipulating a previously formed wire chain, there is provided a chain feeding means including dies which engage opposite surfaces of a link, and means to impart a relative movement to said dies, one toward the other, to subject said link to pressure.

✦ ✦ ✦

No. 2,242,293, SCREW TAPPING MACHINE, patented May 20, 1941 by James A. Eden and Harry Phillips, Springfield, Mass., assignors to Baush Machine Tool Company, Springfield, Mass., a corporation of Massachusetts.

There is provided a driving head to rotate and advance a tap holding spindle, a tap holding spindle rotatably mounted in said head and rotatable on its axis relative to said head and means to support said head to move freely in a plane transversely of said spindle during the rotation of said spindle.

✦ ✦ ✦

No. 2,242,376, MANUFACTURE OF COVERED WIRE, patented May 20, 1941 by Wilson Stoker, St. John's Wood, London, England.

This machine is adapted to wind and spread yarn coverings on moving limp wire.

✦ ✦ ✦

No. 2,242,758, LAG SCREW, patented May 20, 1941 by Michael Ruggieri, Stroudsburg, Pa., assignor to Line Material Company, South Milwaukee, Wis., a corporation of Delaware.

In addition to a conventional head and tapered body portion ending in a point, the body portion is provided with a gimlet and fetter type thread, and said point being provided with a gimlet type thread, said threads forming a continuous helix on said screw.

✦ ✦ ✦

No. 2,242,862, NAIL, patented May 20, 1941 by Walter G. Lodge, Kokomo, Ind., assignor to Continental Steel Corporation, Kokomo, Ind., a corporation of Indiana.

The tapered end of this wire nail has a downwardly facing substantially diametrically extending groove, the ends of the groove extending completely through the tapered end from side to side thereof.

✦ ✦ ✦

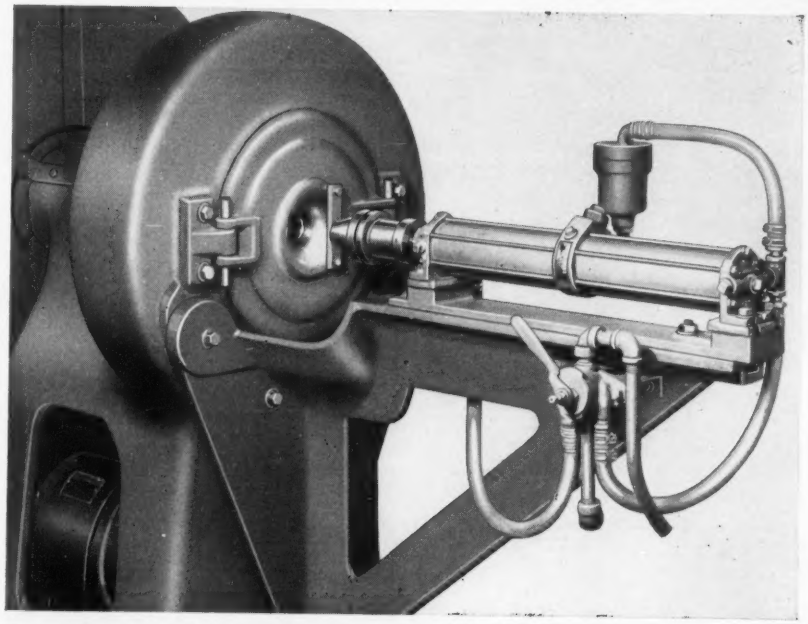
No. 2,242,919, SPRING ASSEMBLY FOR UPHOLSTERY, patented May 20, 1941 by Fred A. Nachman and Fred R. Zimmerman, Chicago, Illinois.

A series of flat sinuous wire springs are provided, having alternately oppositely disposed equal bends, disposed in overlapping relation to the overlapping portions of the upholstery springs.

✦ ✦ ✦

No. 2,243,210, CUSHION SPRING STRUCTURE, patented May 27, 1941 by Jacob Kerstein, Brooklyn, N. Y., as-

(Please turn to Page 417)



Banding 2 to 3 times as many shells per man, per machine, using "Standard" rapid-rapping Swagers

Actually, the savings from using the high speed feeding fixture and Standard Swager shown are fourfold:

1. Production Increased—2 or 3 times over other methods;
2. Improved Physical Characteristics of Band—100% above elongation specification; and 15-20% above tensile strength tolerance;
3. Saving in band material—ranging from 12 to 25%, depending upon the size of shell;
4. Easier to finish turn—because swaging leaves the outside diameter of the finished band smooth.

4500 impact blows per minute attach band to shell by flowing the material, whether gilding metal or pure copper, into the knurling and undercut sides of band groove walls.

These simple facts not only tell an important defense story, but tell a story typical of results which users report after bringing their metal-forming problems to us. May we help you? Give complete information, please. Address—

IT'S STANDARD PRACTICE

STANDARD MACHINERY COMPANY

PROVIDENCE, RHODE ISLAND

Inspection of Army Materiel

(*Continued from Page 403*)

ever, it may become so, especially since the manufacturers will be in the market for process gages at the same time that inspection gages are being procured. It is becoming increasingly difficult now to procure thread gages. Deliveries are quoted six to eight months. While the Department generally furnishes all inspection measuring tools and gages which will be needed by the Ordnance Inspector during the entire life of the contract, the manufacturers of Ordnance equipment can render a great help in this field by planning as far in advance as possible for their production gages.

✦ ✦ ✦

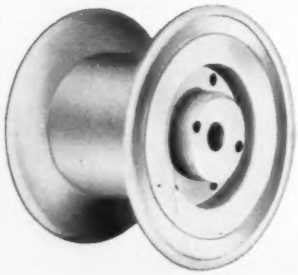
THE gages and measuring tools required by our inspectors run into large numbers; for example, the 37 M/M Mount alone requires 524; the 90 M/M Recoil Mechanism (1 unit in the assembly) 143; and the 90 M/M Mount, 390. There will also be some gage requirements for the new arsenals, approximately forty establishments being constructed at a cost of some 600 million dollars, for the manufacture of components of munitions not ordinarily obtainable in sufficient quantities with existing peacetime facilities. These include powder factories, small arms ammunition plants and plants for essential chemicals and explosives, such an ammonia, TNT and tetryl. Six new loading plants are also being built where such ammunition components as shell and shell cases, fuzes, primers, boosters and detonators will be brought together and loaded into complete rounds. Such establishments as these, and the great tank plant being built in Detroit by the Chrysler Corporation and tooled for mass production of medium tanks will, of course, intensify the gage problem and add an additional load on the inspection service. Superimpose onto these the requirements of the other services, notably the Air Corps and the Navy, and the load which the gage industry must carry becomes one of considerable magnitude. Fortunately this situation was visualized last September and a gage facility expansion was started at seven plants at a cost of some four million dollars. These plants will come into production about June 1 and will substantially increase the gage capacity of the country. Mass production is of necessity interchangeable production; so, in any discussion of a mass production program, such as that of munitions for national defense, the basic problem is that of gages.

✦ ✦ ✦

Effective Procurement Requires Effective Inspection

LET me repeat that no system of procurement is effective without the safeguard of an efficient inspection service to see that the requirements set forth in the contract, the drawings and specifications are met. This service is applied with equal force to arsenal manufacture and to procurement from industry. It is necessary not only for quality control but is the

FINE WIRE HIGH SPEED WIRE DRAWING SPOOLS



James Day (Machinery) Ltd.,
66, Bartholomew Close,
London, E. C. 1., England.

MOSSBERG **PRESSED STEEL** CORP.

A complete line of HEAVY DUTY PRECISION SPOOLS and REELS especially designed for high speed wire drawing and annealing.

The degree of efficiency obtained by the HIGH SPEED WIRE DRAWING MACHINE is largely dependent upon the accuracy and durability of the take-up spool.

The use of our PRECISION SPOOLS will increase your machine efficiency and eliminate your spool difficulties.

Complete range of sizes.

MOSSBERG PRESSED STEEL CORP

18 West Street,
ATTLEBORO, MASSACHUSETTS, U. S. A.

COMBINATION
500 lb. CAPACITY WIRE DRAWING — ANNEALING — STRANDING — REEL.

best assurance for production efficiency. Inspection must be performed concurrently with production and should assist in obtaining the required material in the shortest possible time. It should catch errors, if any, before the article is finished. **Rejection** of material is not to be considered as an objective of inspection.

✦ ✦ ✦

WE believe that the system of inspection established by the Ordnance Department is sound, and capable of meeting the demands which will be placed upon it. It is the desire of the Department that the Ordnance work be made as attractive as possible to the manufacturers and subcontractors, while securing for the government at as low a cost as possible, material and equipment in compliance with requirements. It is vital that we do everything possible to speed up production to obtain the greatest amount of acceptable material in the shortest possible time. To that end, whenever practicable to do so, the Department furnishes actual samples of items to be manufactured. Tooling for mass production is, of course, a responsibility of the manufacturer, as is also the execution of manufacturing operations. However, the Department permits, and in fact encourages, factory representatives to visit the arsenals to study arsenal methods, and to obtain available technical information on the manufacture of items of mutual concern. We are glad to advise and assist in every way possible to speed up production, and to send officers and trained technicians to the new manufacturers to help them organize and start on the road to production.

✦ ✦ ✦

How Manufacturers Can Assist Inspection

ONE way, and an exceedingly important way, in which the manufacturer can assist the Department as well as himself, is to provide for reasonable inspection of his own products prior to submitting them for Ordnance acceptance. It is impracticable for

(*Please turn to Page 408*)

PRODUCTION OF DRAWN WIRE, BARBED WIRE, WOVEN FENCE, BALE TIES AND FENCE POSTS

Years	Drawn wire	Barbed wire	Woven fence	Bale ties	Fence posts
1936	2,689,338	191,946	231,491	59,005	68,544
1937	2,607,030	183,928	252,405	55,726	69,243
1938	1,960,954	143,581	202,496	39,861	44,527
1939	2,924,293	229,807	280,579	57,348	61,167
1940	3,071,824	219,222	257,718	65,762	64,236

PRODUCTION OF NAILS

Years	Wire nails	Cement coated wire nails (a)	Cut nails and cut spikes
1929	655,052	105,937	26,692
1935	443,596	52,301	19,748
1936	595,999	70,738	26,314
1937	543,329	70,494	24,425
1938	481,980	46,733	19,662
1939	673,914	65,705	24,913
1940	648,593	72,564	24,377

(a) Included in production of wire nails.

ARE YOU COMING TO PHILADELPHIA, PA. OCTOBER 20-24, 1941

To Attend The Eleventh Annual Convention of the Wire Association?

✦ ✦ ✦

CONVENTION HEADQUARTERS WILL BE AT THE HOTEL PHILADELPHIAN

✦ ✦ ✦

A splendid opportunity is offered to discuss informally, routine production problems and to exchange opinions and ideas regarding equipment and processes used in the industry.

For this purpose informal gatherings are held at the Wire Association headquarters in the Hotel Philadelphian, which are open from 9 A. M. to 11 P. M. during the convention.

Every wire production executive engaged in the manufacture or fabrication of wire and wire products of any kind is invited to join The Wire Association and attend these meetings.

✦ ✦ ✦

THERE WILL BE A REGISTRATION FEE OF $5.00

✦ ✦ ✦

MAKE YOUR PLANS NOW TO ATTEND

✦ ✦ ✦

For detailed information on Program, Membership, Hotel Reservations and Transportation

Address RICHARD E. BROWN, Executive Secretary

300 Main Street Stamford, Conn.

Inspection of Army Materiel

(*Continued from Page 407*)

Ordnance Inspectors in many cases to make 100% inspection of all articles. The extent of Ordnance inspection is gaged somewhat by the type and extent of inspection provided by the manufacturer himself. The importance of thorough company inspection is obvious. The more thorough such inspection the surer, too, are we to obtain material which will be dependable and safe in operation.

Necessity for Rigid Inspection

IT is not necessary for me to emphasize the need for inspection to insure safe and dependable characteristics which we so much desire in our equipment. The necessity for rigid requirements for such items as wire 110 and 130 are, I am sure, obvious to you who are specialists in this field. The products of the wire industry—some 800 items required for war purposes—of course, have always held a key position in our defense materiel. No one knows better than you that "The wire requirements of the Army and Navy, ranging from submarine cable to fine thoriated tungsten filament for vacuum tubes are necessarily severe, particularly with respect to **uniformity.** A hard spot in a single strand of wire rope may cause a break, costing the lives of a dozen men and the 'washout' of a hundred thousand dollars worth of airplane. A slight variation in cross section in a delicate magnet wire may throw a radio set 'off the beam' with fatal results. A batch of brittle steel finding its way into field telephone wire—and we have another 'lost battalion.'"*

✦ ✦ ✦

INSPECTION, assuring safety, dependability and performance without undue interference with production, is what we all desire. I am confident that the Ordnance system, with the splendid coöperation of industry — your industry and others—which is being so fully and so freely given, will meet the inspection requirements yet to come.

✦ ✦ ✦

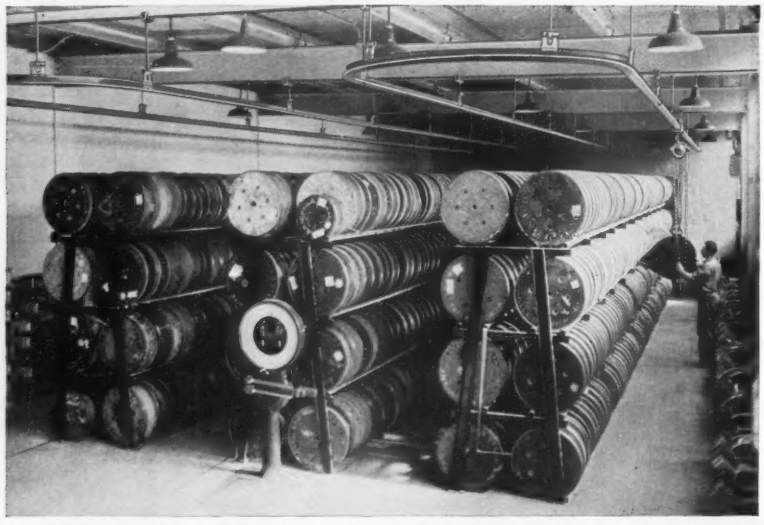
***Taken from Army Ordnance, Vol 20, No. 116, September-October, 1939, "Ordnance Research, The Importance of Uniform Metal Products for Armament.**

✦ ✦ ✦

A Practical Discussion of Zinc-Iron Alloys

(*Continued from Page 387*)

dross has a white metallic look, while high temperature dross often shows the zinc-iron alloy crystals plainly, and the appearance is bluish to purple, indicating more heat. The color is due to oxidation in the air when the dross is brought up out of the bath, cut and sliced, and cooled. Every practical galvanizer also knows that if the bottom of the pot is hot, his dross will be packed very tightly, and will be hard in the pot; sometimes even sandy, if the bottom is hot enough. Low temperature dross is soft and "slushy," and may even be so soft that it runs back into the pot through the holes in the dross spoon. As the temperature reaches near to 900 degrees F. the dross has a tendency to pack very tightly, and due to the iron content the dross can be noticed to be heavy. It



1728 REELS STORED HERE

THE method of storing and handling wire stocks at The National Electric Coil Company, Columbus, Ohio, by means of racks and a Cleveland Tramrail overhead rail and chain hoist system has attracted considerable attention.

The three racks shown above are 63 feet long, will accommodate 576 reels per row or a total of 1728 reels. This number of 24" reels will comfortably store 300,000 lbs. of wire.

The Cleveland Tramrail system with easily operated chain hoists and special reel grabs makes it a simple task to load and unload the racks. Each space for a reel is numbered and each reel is weighed before placing on the racks, which makes the keeping of a perpetual inventory an easy matter.

This storage system very admirably takes care of the standard round, square and rectangular wire. Sizes of wire that are used infrequently are rolled and insulated as needed in National's wire section.

This is just one of the thousands of handling problems solved with Cleveland Tramrail.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
1141 East 283rd St. Wickliffe, Ohio

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT
Other products: CLEVELAND CRANES and STEELWELD MACHINERY

shows less zinc, and has a dark blue or purple color indicating the heat. Such dross will show 3.75 to 4.00% iron content.

✦ ✦ ✦

Fourth Practical Phase of Zinc-Iron Alloys

THE large slender needle-like zinc-iron alloy crystals that form at temperatures under 900 degrees F. are shown in PLATES 9 and 10. PLATE 9 is actual plant dross, and PLATE 10 are zinc-iron alloy crystals taken from actual plant dross. In PLATE 9 the zinc-iron alloy crystals are embedded in the bath of zinc frozen around them; in PLATE 10 the zinc-iron alloy crystals were broken loose from the dross, and only the crystals photographed. These crystals are shown here to bring out the contrast from the form of the zinc-iron alloy crystals developed in the fourth phase which is at temperatures above 900 degrees F. The form of the zinc-iron alloy crystal has made it possible to tell whether a galvanizing bath is above or below 900 degrees F. without even seeing the bath. Above 900 degrees F. the zinc-iron alloy crystal form changes to a hexagonal pyramid of the first order in the hexagonal system of crystallization. It resembles two six-sided pyramids put together base to base, with the points farthest apart. The strangest and most interesting thing about this new form of zinc-iron alloy crystal is that it appears to be built up of six-sided plates piled one on top of the other, with each one getting smaller until the peak or point is reached.

✦ ✦ ✦

AT temperatures of 950 to 1000 degrees F. the zinc-iron alloy crystals take on the form shown in PLATE 11. The reason some of the crystal forms are not perfect hexagons is because the crystals have been cut at an angle when preparing the specimen. One small perfect hexagon can be seen. The zinc crystals can be seen in the background.

✦ ✦ ✦

WHEN the bath temperature is very high, the zinc-iron alloy crystals become still larger. It is to be noted as seen in PLATE 12 that they still have the six-sided hexagonal form. Continued heating of the bath seems to bring about a constant readjustment of the relationship of the zinc and iron, always releasing zinc and increasing the iron value proportionately. The story at the much higher temperature seems to be one of rapidly increasing the iron content. At high temperatures the zinc becomes so much more active that it takes up iron by leaps and bounds, thus drying up the zinc, and increasing the crystals. This "sweating" as it has often been called by the practical galvanizer, goes on until the entire bath may be turned into dross. The higher the temperature goes, the higher it must keep on going to keep any liquid zinc at all. The attacking power of the zinc for iron increases rapidly above 900 degrees F., in fact the curve goes almost straight up with an increase in temperature. The action becomes violent above 900 degrees F., and increases with astounding activity as the temperature rises.

(*Please turn to Page 410*)

DEFENSE PARTS TURNED OUT FASTER

WITH **TECO** CARBIDE WIRE DRAWING **DIES**

Interruptions — for die recutting and replacement — are fewer when you process through Teco Carbide Dies. Not only can you draw wire faster, but you'll draw better wire, too . . . wire with a smoother surface. Teco Dies are near-diamond hard, therefore slow to wear. Hence Teco's unusually smooth, even drawing performance and longer die life. For the smoother, more uniform finishes required of wire for defense parts . . . for the faster, uninterrupted production the Emergency demands, the finest carbide wire drawing dies are an economy. Investigate Teco Dies today.

Pioneers in Tungsten Carbide for over a Quarter of a Century

NEVER SAY DIE . . . *always specify*
TECO CARBIDE DIES
for smooth wire drawing . . . THEY LAST LONGER

Tungsten Electric supplies carbide blanks, tools, bits. Wire and bar dies, tubing, extruding and sizing dies. Also, special tools, such as spot facers, reamers, broaches, form tools, etc.

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Branch Office 2900 Euclid Ave., Cleveland, O.

A Practical Discussion of Zinc-Iron Alloys

(*Continued from Page 409*)

Practical Operating Conditions

IT is almost unbelieved, but it is true that galvanizing baths have been so hot that the dross when removed broke down into a mass of zinc-iron alloy crystals that could be actually shoveled like sand. The pots lasted from two weeks to three months. The temperature at the top of the bath was found to be 840 degrees F. while the amazing temperature of 1350 degrees F. was found at the bottom of the pot.

✦ ✦ ✦

Fifth Stage Produces Zinc-Iron Alloy Crystals

THE final stage gives a mass of zinc-iron alloy crystals. On the one end at the beginning we have the metal zinc; at the other end we have the final product zinc-iron alloy crystals, and no zinc. That is the system; from zinc to zinc-iron alloy crystals with a range of temperatures from low temperatures to very high temperatures, far, far above actual galvanizing range.

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IT is both interesting and practical now to compare the zinc-iron alloy crystals at low temperatures as found in the ordinary galvanizing bath, and the zinc-iron alloy crystals found at a temperature far above the practical galvanizing range. This is perhaps seen the clearest by comparing the crystals shown in PLATES 13, 14, 15, and 16, with those seen in PLATE 10. PLATES 10 and 16 reveal the story. Attention is called to the plates between the pyramids in the crystal shown in PLATE 16.

✦ ✦ ✦

SOME years ago the writer was given a piece of zinc-iron alloy which was the residue from an electric furnace. This alloy contained 19.58% iron and was said to be the residue left from making zinc oxide from dross in an electric furnace. This furnishes another conception of temperature relation to zinc-iron alloys. The zinc-iron alloy crystals shown in PLATES 13, 14, 15, and 16 were made at 1500 degrees F., and when analyzed showed about 8.00 per cent iron content.

✦ ✦ ✦

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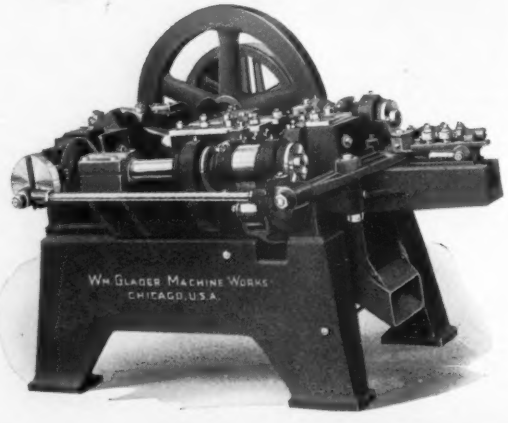
HIGH SPEED WIRE NAIL MACHINE



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210 N. Racine Ave. Chicago, Illinois

Glader Machines on large head, single-blow roofing nails can be seen in operation at any of the independent wire mills in the United States.

The production figures on common nails shown below, are guaranteed.

SIZE MACH.	SIZE WIRE	MAX. LENGTH OF WIRE	NUMBER OF NAILS PER MIN.	CAP. IN POUNDS PER HR.
#00A	#16	1⅛"	700	37.2
#00	#14	1¼"	550	55
#0	#12	1¾"	450	89
#1	#10	2½"	400	192
#2	#8	3½"	325	310
#3	#4	5"	225	523
#4	#1	7"	190	622
#4s	5/16"	9"	175	1155
#5	⅜"	12"	160	2400

This high output and economical operation account for the GLADER machine being accepted as standard equipment in all recent installations.

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✦ ✦ ✦

Norman L. Deuble, Sales Manager, Copperweld Steel Co.

NORMAN L. Deuble, formerly assistant to vice-president, Copperweld Steel Company, Warren, O., has been appointed manager of sales. Mr. Deuble is a graduate of the Case School of Applied Science with the degrees of B.S., and metallurgical engineer; he is a member of the American Society for Metals and of the Society of Automotive Engineers (a member of the Iron and Steel Committee of the S.A.E.). Mr. Deuble was with Republic Steel Corporation, Central Alloy Company, and United Alloy Steel Company before joining Copperweld.

J. M. Howell, Manager, Schenectady Works, General Electric Co.

J. M. Howell, executive assistant to **E. D. Spicer,** manager of the Schenectady works, General Electric Co., was named to succeed his chief, who has been advanced to the post of assistant to the vice-president in charge of manufacturing. Mr. Howell started his career at General Electric 40 years ago when he was engaged as a shop clerk. From 1901 to 1937 he served in various accounting positions until he was made executive assistant to Mr. Spicer. A graduate of Cornell University in 1912, Mr. Spicer was chief engineer and factory manager of Kerr Turbine Co., Wellsville, N. Y., before going to General Electric.

Make your plans now to attend the Annual Convention of The Wire Association to be held at the Hotel Philadelphian, Philadelphia, Pa., October 20-24, 1941.

All-Metal WIRE SPOOLS

CABLE SPOOLS . . . *for Insulated and Rubber Covered Wire, Solder, and similar products.*

These spool ends are formed from cold rolled steel of gauges to meet specific demands for strength. The edges are curled and ribs embossed for increased rigidity. Panels may be worked into your design and embossed, for use in marking size and variety. All parts are lithographed for identification purposes and to protect the metal.

Ends and traverses may be shipped unassembled. A simple operation on a hand, foot, or power press makes rigid and permanent assembly.

Made in 5", 6½" and 10½" diameter Ends; Traverses 1 15/16" diameter (or special 3½" diameter for 10½" End), in any desired lengths.

FINE WIRE SPOOLS . . . *for winding and shipping Fine, Steel, Copper, and Enameled Wires.*

Spools are formed from tin plate tested for maximum rigidity. Made with locked-seam barrel and one-piece ends, they are so assembled that there is no possibility of wire being trapped in the joint where barrel and end meet. Ends are made with full curl on edge, which provides additional strength and a smooth winding edge.

Entire spool may be finished with gold lacquer or a variety of colored lacquers; with or without identifying copy embossed in the ends.

Made in 2 7/16" and 3" diameter Ends. The 2 7/16" size is made with 1½" diameter Traverse only; the 3" diameter with 1½" or 1¾" diameter Traverse.

We will send samples at your request.

J. L. CLARK MANUFACTURING CO.
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The Aluminum Situation

AT present, there is no shortage of aluminum for national defense, although civilian applications have been materially curtailed. This reduction in civilian uses has affected many who have, because of the pressure of defense demands for aluminum, been forced to accept substitutes for the duration of the war.

Modernization of this main mill building at the plant of the Firth-Sterling Steel Company has been completed. New sidewalls of brick, glass and steel were constructed to provide more working space, better light and improved ventilation. Also installed as part of the modernization program were new washrooms, showers and lockers. The plant produces high speed, tool and stainless steels. ✦

JUST how long we will be able to say "There is no shortage of aluminum for national defense" is problematical. There may be a shortage next month, in six months, in a year. It depends largely on plane production, not only for the United States but for Britain as well. According to a recent announcement by W. S. Knudsen, the expanded plane program will require an annual production of 1,600,000,000 pounds of aluminum. The best available estimates indicate that this is more aluminum than the whole world produced last year.

✦ ✦ ✦

ALUMINUM production in the United States during 1939 was 327,000,000 pounds. Domestic production at present is at the rate of nearly 600,000,000 pounds annually, and by July, 1942 will reach 825,000,000 pounds a year. Until recently, Aluminum Company of America was the sole producer of primary aluminum in this country, and by July of 1942 it will have

THE ANNUAL MEDAL AWARD

OF THE

WIRE ASSOCIATION

FOR THE MOST MERITORIOUS PAPER ON
WIRE MANUFACTURE OR FABRICATION DURING THE YEAR

ALL members of the Wire Association are cordially invited to submit technical papers either for publication in "WIRE & WIRE PRODUCTS" during the year or for presentation before the Annual Wire Association Meeting at Philadelphia, October 20-24, 1941.

✦ ✦ ✦

FOR 1941 and subsequent years a medal will be awarded in each of the two major divisions of the activities of the Association, to the papers coming nearest to the requirement set forth above.

✦ ✦ ✦

CONSIDERATION for the Medal Awards is not limited to the papers presented at the Annual Meeting, but is given to all papers submitted by members and published in "WIRE & WIRE PRODUCTS" during the year.

✦ ✦ ✦

SELECTION of papers to be presented at the Annual Convention rests in the hands of the Joint Program Committee of the Wire Association.

✦ ✦ ✦

ALL papers submitted become the property of the Wire Association, and the Board of Directors constitutes the Committee on Awards.

✦ ✦ ✦

ADDITIONAL information may be obtained by addressing:

RICHARD E. BROWN,

SECRETARY, THE WIRE ASSOCIATION

STAMFORD TRUST CO. BLDG., STAMFORD, CONNECTICUT

completed a national defense expansion program which will more than double the production built up over a half century of operation. In 1942, the company's production of new metal will amount to more than 720,000,000 pounds; and to reach this production, as well as to expand fabricating facilities, the company will have expended $200,000,000, all of which it is financing itself.

✦ ✦ ✦

THE forging capacity in the plants of Aluminum Company of America has been increased approximately 175 per cent; extruded shapes capacity, sheet capacity, and tubing capacity have in each case been more than doubled; while wire, rod and bar capacity is up 130 per cent, and sand casting capacity is now approximately 200 per cent more than it was at the start of the war in September, 1939.

✦ ✦ ✦

Cuba

IMPORTS of iron and steel products into Cuba through the port of Habana (which account for about 70 per cent of Cuba's imports of these commodities) totaled 5,687 metric tons in April, as compared with 3,933 tons in March, 3,074 in February, and 3,562 in January, according to private compilations from ships' manifests. Of the April imports, bars (1,710 tons) and tinplate (1,636) were, in quantity, by far the most important items of the 15 types of iron and steel products figuring in the trade.

✦ ✦ ✦

THE large increase in imports in April, as compared with previous months of 1941, is believed to reflect an inclination on the part of Cuban importers and distributors to build up their stocks to somewhat high levels. Stocks of merchant iron and steel products at present, however, are considered to be hardly above normal, in view of the fairly active movement of material into consumption channels.

This is an invitation for you to become a member of The Wire Association. ✦ ✦ ✦ ✦ ✦ ✦

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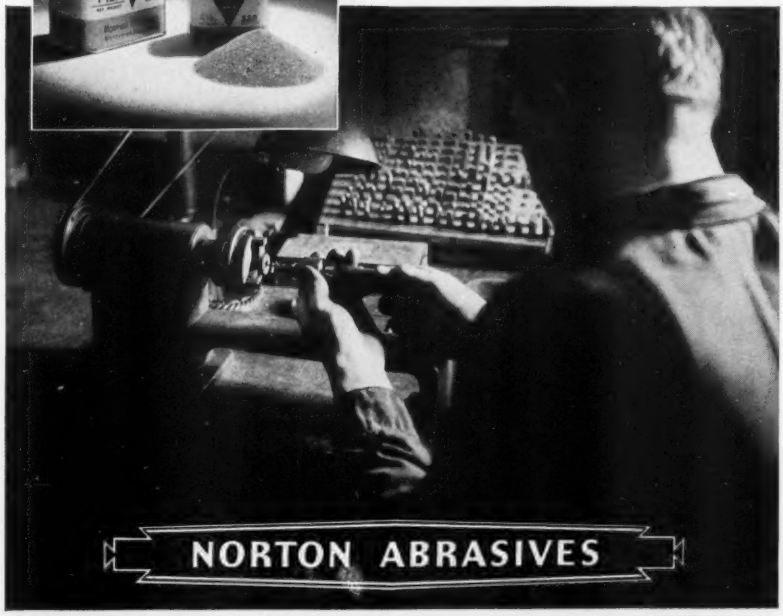

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From all quarters has come commendation of this latest ASM book on practical metallurgy. Already four famous engineering schools—Case School of Applied Science . . . University of Wisconsin . . . Brooklyn Polytechnic Institute . . . Stevens Institute of Technology — are planning to use this book as a textbook for their courses in metallurgy.

Typical of other responses is that from Dr. Zay Jeffries, General Electric authority, who says: "The book constitutes a valuable addition to the literature of metallurgy".

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Here is the book you've long wanted — a simple yet complete treatise on practical metallurgy.

WIRE & WIRE PRODUCTS
300 Main Street Stamford. Conn.

Leslie C. Jacobson

LESLIE C. JACOBSON, superintendent in charge of fabrication departments of Carboloy Company, Inc., Detroit, Michigan, died June 24 in Detroit, at the age of 51. Mr. Jacobson had been associated with Carboloy Company as a production executive since 1937. Prior to this he was with the Union Wire Die Corporation for a period of 15 years.

✦ ✦ ✦

MR. JACOBSON was widely known throughout the wire industry due to his work with diamond die and carbide die manufacture and application. He also had a wide acquaintance among early executives of the motion picture industry, having been associated with that industry in former years in a technical capacity. During the World War he served overseas as an officer with the A.E.F.

✦ ✦ ✦

MR. JACOBSON is survived by his wife, France N. Jacobson, his mother, Mrs. Katherine N. Jacobson, and a sister, Mrs. Caroline E. Newman.

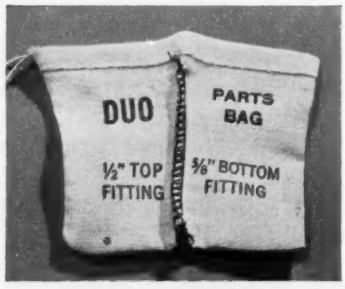
New Bag Developed for Industrial Use

THE Ames Bag Machine Company, 1991 East 66th Street, Cleveland, has developed a new type of cotton parts bag for industrial use. This bag is available with two or more compartments sewed into the cloth. It is designed for use where two or more parts of any kind must be shipped together but with some protecting wall between them.

✦ ✦ ✦

THEY are well adapted for shipping or mailing of bearings, springs, pump and compressor parts, small gears, nuts and bolts and the like. They can be made in any size or shape, with any number of compartments, and come in three general types.

✦ ✦ ✦



THE "mailing bag" is a sack with drawstrings and an address tag. The "parts bag" has only drawstrings, and is used primarily to prevent loss of small parts by tying them to the product or its crate. The "envelope bag" has an envelope sewed into one of its seams so that first class mail may be sent along with third or fourth class mail in the bag.

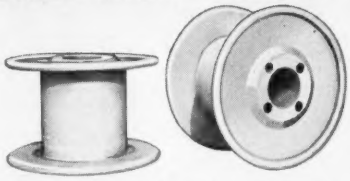
✦ ✦ ✦

THESE bags can be purchased with company names, sizes of parts, assembly instructions, or any other desired information already printed on them. For instance, a three-compartment bag with a different kind of part in each compartment, could have the name or size of each part printed on the proper compartment. Free samples will be sent on request.

✦ ✦ ✦

IN such cases, they speed operations by saving the time con-

APCO MOSSBERG
STEEL REELS & SPOOLS



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Apco Mossberg Steel Reels are standard equipment in the wire industry—and for good reason! Apco Mossberg—the original Frank Mossberg Co.—**originated** the steel reel idea and have been training workmen in their manufacture ever since. Personal attention by Apco Mossberg engineers make each job a "special".

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We will gladly submit drawings, blueprints, or suggestions without obligation to you. Write for quotation today.

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(The Original Frank Mossberg Co.)
21 Lamb Street, Attleboro, Mass.

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IF YOU WANT LONGER DIE LIFE

Today's urgent necessity to speed-up production makes it important to investigate every method, material or new development that helps achieve this end.

In many well-known wire mills, the standardized use of Oakite Composition No. 24 and other Oakite materials for de-greasing and drawing wire has resulted in longer die life, brighter wire, shorter baking time and other money-saving advantages.

Let us help you in establishing the same results in your mill. Write today for details. No obligation.

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Representatives in all Principal Cities of U. S. and Canada

OAKITE CERTIFIED CLEANING
MATERIALS METHODS SERVICE

sumed in separate wrapping of parts, they prevent marring or other injury, they save space, their light weight saves mailing cost, their simplicity of construction makes them inexpensive, and their variety of application makes them useful in many fields.

✦ ✦ ✦

AIRCRAFT companies have already started to use them for shipping small, polished parts by airmail from parts plants to assembly plants, and from manufacturing plants to airports for speedy repair of disabled planes.

✦ ✦ ✦

Robert M. Peterson, Assistant Advertising Manager, American Steel & Wire Company

ROBERT M. Peterson, assistant advertising manager of the American Steel & Wire Co., died suddenly on Memorial Day at Scottdale, Pa.

✦ ✦ ✦

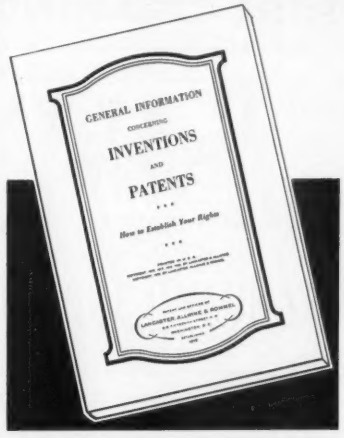
MR. Peterson was born in Iron River, Mich., on June 18, 1889, and was educated in the public schools there and in Chicago, Ill. Later he attended business school in Youngstown, Ohio.

✦ ✦ ✦

HIS earliest business experience was with the Mahoning Foundry Co., Republic Iron and Steel Co., New York Central Railroad and the Equitable Life Insurance Co. In 1918 he became associated with the MacDonald Works, Youngstown of the Carnegie Steel Co., subsidiary of U. S. Steel Corp. In 1920 he joined the General Fireproofing Co. in the general sales department with duties in sales promotion and was transferred to Cleveland in 1921 as district sales manager, later working as special field representative of the Truscon Steel Co., which absorbed General Fireproofing. In 1933 and 1934, after leaving Truscon, he did special work for the Chairman of the Board of the Fourth Federal Reserve District. He joined American Steel & Wire Co. in the sales promotion and advertising department on March 1, 1934.

STEEL REELS AND DRUMS *for* WIRE AND CABLE INDUSTRY

R.B. HAYWARD CO.
1714 Sheffield Ave. Chicago, Ill.



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Paralan will give your finished wire and wire products protection from atmospheric corrosion in the mill and in shipping. Paralan-coated wire can be spot welded or soldered without cleaning. Also, Paralan leaves surfaces in good condition for all types of finishes—enameling, japanning, lacquering, plating, etc.

Write for further information. We may be able to solve your difficulties.

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LAWRENCE, MASSACHUSETTS

STEELSKIN

REG. U. S. PAT. OFFICE

For High or Low Carbon Wire

WIRE DRAWING SOAPS

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WIRE DRAWING LUBRICANTS FOR

HIGH OR LOW CARBON WIRE, COLD HEADING,
BRIGHT AND WET WIRE DRAWING.

STANDARD "WIRE DRAW"

SPECIALLY ADAPTED FOR HIGH SPEED DRAWING MACHINES
BETTER FINISHED WIRE — LOWER DIE COSTS

STANDARD INDUSTRIAL COMPOUNDS CO.

CHICAGO, ILLINOIS

Manufacturers of materials, tools and equipment for wire drawing and forming plants are constantly making improvements and additions to their lines. If you do not find the product or service in which you are interested, additional information will be supplied promptly. Simply address:

WIRE & WIRE PRODUCTS

Stamford Trust Co. Bldg.,
300 Main St. Stamford, Conn.

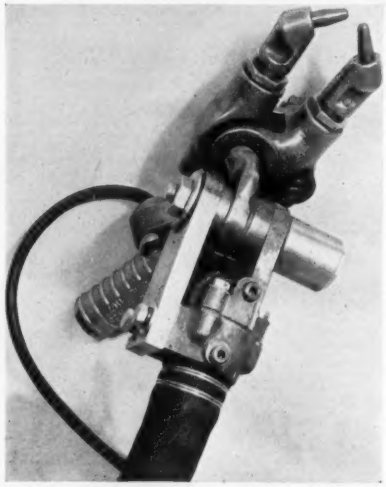
Progressive Announces New Kickless Cable

A LINE of low cost kickless welding cables of "full concentric" design for reduced current loss and with positive and negative current strands wound at steep helical angles to increase ease of flexing and reduce wear are announced by Progressive Welder Co., 3050 E. Outer Drive, Detroit, Michigan.

✦ ✦ ✦

DEVELOPED by Progressive in conjunction with Habirshaw Cable & Wire Co., the new "P-H" cables are available in a complete range of capacities to suit almost any portable gun welding used.

✦ ✦ ✦



Progressive Welder's new full-concentric cable shown here attached to a gun with a single bolt type of self-locking terminal. The combination of such a terminal, permitting gun swiveling when pressure is not on, reduces effort in handling welding equipment still further in addition to the surprising universally flexible new cable. ✦

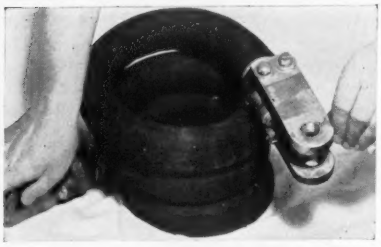
THE new kickless cables have a rated capacity 50% in excess of conventional cables of the same size, increased efficiency due to full concentric arrangement of copper, increased life because of extra heavy insulation and marked reduction of wear by external abrasion. Gun handling is thus made easier not only by the kickless feature but also by virtue of the smaller cross-section of the cable.

✦ ✦ ✦

THE water supply core of the cable consists of 3/8" interlocked bronze tubing having high flexibility characteristics. Six current carrying bundles, of seven copper strands each, enclose this

core and are so formed that any flexing causes them to "unwind" rather than bind, as in conventional cables. A heavy reinforced rubber insulating tube separates these inner strands from the outer strands which are also wound at steep helical angle. Between the outer strands and the external, extra-heavy abrasion resistant cable covering is space provided for water circulation.

✦ ✦ ✦



Illustrating the remarkable ease with which the new P-H cable can be flexed. The cable shown is an eight foot length rated at 600,000 circular mills.

✦ ✦ ✦ ✦

THE P-H full-concentric welding cable can be ordered with almost any terminal for welding guns of any standard make. Terminal shown is the single bolt type recommended for use with the latest style Progressive gun with automatic terminal clamping device. This terminal permits free swiveling of the gun at the end of the cable, while locating the gun for a weld.

✦ ✦ ✦

A Review of Recent Wire Patents

(*Continued from Page 405*)

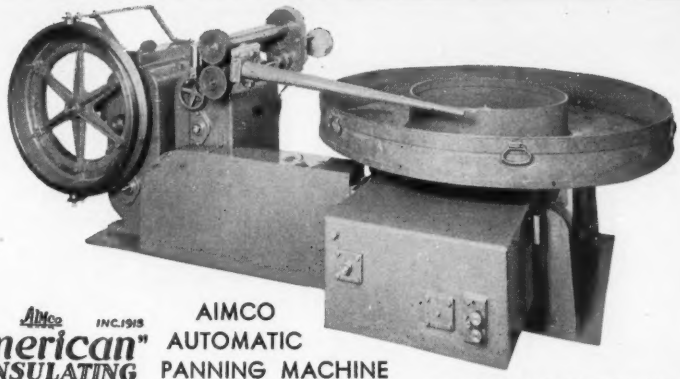
signor to Spring Products Corporation, New York, N. Y., a corporation of New York.

Edging sections are provided for each of the upper and lower marginal edges of the coil springs, each of the edging sections being fashioned from a length of wire extending tangentially of the end convolutions of the intermediate spring units and secured thereto, and a rebent terminal at the opposite end of each section disposed at an acute angle to the intermediate or body portion thereof, said terminals being secured tangentially to the portions of the end convolutions of adjacent corner spring units and located adjacent the intermediate spring units.

✦ ✦ ✦

No. 2,243,560, INSULATED ELECTRICAL CONDUCTOR, patented May 27, 1941 by Ralph W. Hall and Henry A. Smith, Fort Wayne, Ind., assignors to General Electric Company, a corporation of New York.

Invention lies in the provision of the insulation for the wire conductor. This comprises a combination of spun glass and polyvinylal resin.

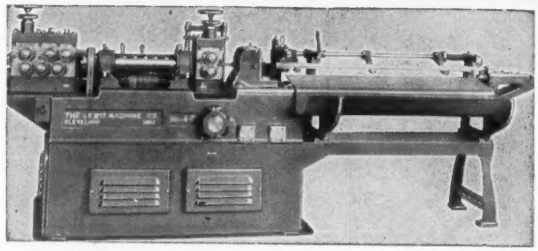


EST 1855 AIMCO INC. 1915
"American" INSULATING MACHINERY COMPANY
REG. U.S. PAT. OFF.

AIMCO AUTOMATIC PANNING MACHINE
For Rubber Covered Wire Ball Bearing

517 West Huntingdon St.
PHILADELPHIA PENNSYLVANIA U.S.A.

LEWIS TRAVEL-CUT WIRE STRAIGHTENING and CUTTING Machines



Machines for 1/16" to ¾" rod
Round
Square
Flat
Hexagon
Ferrous and Non-Ferrous

Automatic
High Speed
Heavy Duty

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WE CAN SUPPLY AND ENGINEER OUR TOOLS EQUIPPED WITH CARBOLOY CEMENTED CARBIDE

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WE also build machines for forming Paper Clips, Buckles, Gate Hooks, Coat and Hat Hooks, Ceiling Hooks, Wire Ears, Cable Rings, Screw Eyes, Sash Chains, Automobile Side Chains, Flat Open Link Chains, Staples, Cotter Pins, Hose Clamps, Etc., and Wire Straighteners, Wire Reels, Frame Bending Machines and Special Presses.

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Sales engineers in all principal cities.

Thousands in daily use producing maximum results in mass production plants.

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•

Quality Diamond Dies Since 1870

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DIES AND NOZZLE CO., INC.
68-25 Adams at 68th Street
Guttenberg, New Jersey

Machine for Reclaiming Copper And Zinc

THE shortage of metals creating an acute need for salvaging zinc and copper from shimmings, the Dreisbach Engineering Company, 45 Warburton Avenue, Yonkers, N. Y., has redesigned and improved a machine used extensively in the first World War, and, is offering this equipment to wire mills. This reclaiming mill is said to eliminate the scrap pile and will provide clean remelting metal at a cost of approximately one quarter of a cent per pound, not including fixed charges, plant burden, and subject to variations in power and labor costs.

✦ ✦ ✦

THE feed is directly into the drum through the charging hopper at a rated capacity, continuously passing through the rolls, crushing the cinders and slag. The constant flow of re-circulating water removes the finely ground waste material and uncrushed charcoal. This waste or tailings is deposited in the settling tank. The charcoal, which floats on the water in the settling tank, is recovered with a screen scoop. The feeding is continued until the drum contains a full charge of metal concentrates. It is essential to run the charge up to full capacity of metal to produce clean, washed concentrates in the shortest operating time. The middlings, which settle in the first section of settling tank are returned for the next milling. The sediment or muck in the settling tank has no commercial

VIANNEY
Famous Wire Drawing Diamond Dies

These famous Diamond Dies are now produced here at moderate prices.

All sizes are in stock or made to order to your specifications

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V. J. Boulin, Manager

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DIES
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Phone JOurnal Square 4-5105

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Fort Wayne Wire Die, Inc.
2002 S. Harrison Fort Wayne, Ind.

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Write us today for prices and particulars.

Accuracy, long life at high speed and dependability is built into each Wayne die by skilled craftsmen, experienced in the making of quality dies. Only the best quality diamonds are used.

Wire drawers state that "Wayne dies are the best value obtainable".

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Wire Drawing Diamond Dies

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Continuous Straightening and Cutting Machinery
With
FLYING SHEAR
for round and shaped wire.
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UNIVERSAL WIRE REEL
Quickly and easily adjusted to any angle within 90 degrees. Cut shows one angle.
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THE F. B. SHUSTER CO.
New Haven, Conn.
Straightener Specialists Since 1866

Hy-Carbo Steel Co.
EST. 1917
✦ ✦ ✦
HIGH GRADE CUSTOM WIRE DRAWING
In Rounds
Less Ton Lots A Specialty
✦ ✦ ✦
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Annealing Pots and Boxes
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Pressure Vessels
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Established 1895
Washington, Penna.

"THE SHIFTWEIGHT"
TILTING WIRE REEL
One man loading reel = for wire coils up to 300 pounds.
MOSLO MACHINERY, INC.
CLEVELAND, OHIO

STEEL STEVENS REELS
FOR
WIRE AND CABLE INDUSTRY
STEVENS METAL PRODUCTS CO.
NILES, OHIO.

value and should be removed before the tank is one-half full. The metal concentrates are removed by shifting the hand lever to drop the charging hopper while the mill is operating.

✦ ✦ ✦

THE center crushing roll is mounted on a large diameter shaft with bearings outside of the drum. The top crushing roll, mounted on a water lubricated bushing, rides on the center roll, is held in position with a yoke and with ample clearance to pass over large size pieces and continually pound the material with full static weight of the combined roll. bushing and yoke. The yoke fulcrum is attached to the main frame.

✦ ✦ ✦

THESE mills are designed for continuous and heavy duty service, and are the result of years of development and a gradual substitution of design and material to reduce cost of maintenance and produce a high quality, clean metal concentrate and a low grade tailings.

✦ ✦ ✦

A. M. Byers Co. Enters Alloy Steel Field

A. M. Byers Company will enter the field of alloy steel manufacture about June 15, when its new electric furnace equipment will be placed in initial operation.

✦ ✦ ✦

AVAILABLE alloy steel production for America's defense needs will then be increased by another 30,000 to 40,000 tons a year, according to L. F. Rains, president.

✦ ✦ ✦

CONSTRUCTION of a plant addition and the installation of electric furnace equipment at the Byers Ambridge works have been speeded because of the shortage of alloy steel in the present emergency, Mr. Rains stated, and added that production will begin six weeks ahead of the original schedule.

✦ ✦ ✦

INITIAL products will be billets and bars for alloy steel fabricators.

GEORGE D. HARTLEY
CONSULTANT & SPECIALIST
In Wire Manufacturing & Wire Forming Equipment
Development & Research
New Processes — Designing
Inventions — Patents
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Wire Mill Equipment, Layout and Practice
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Phone: Worcester 5-6033

WIRE MACHINERY SPECIALISTS
3—Nilson No. 1, 3 & 4 4 Slide Wire Machines
2—Baird No. 3 & S3F 4 Slide Wire Machines
7—Waterbury Step Cone Wire Drawing Machines
1—Two Spindle Bull Block Motor Driven
6—Lewis Welding Wire S & C Machines M. D.
2—Shuster Shaped Wire S & C Machines ½" & ⅞"
8—Shuster Round Wire S & C Machines 1/32"-½"
Wanted: Tack Making Machinery. All Sizes.
NATIONAL MACHINERY EXCHANGE
128-138 MOTT ST. NEW YORK, N. Y.

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CREPE PAPER
In rolls of any size for wrapping coils and reels.
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Toronto Acid Brick
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PRODUCTIMETERS
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Main Plant and General Offices—Toledo, Ohio

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PROVIDENCE, R. I.

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One used Kratos, 13 Die, 4 drum, low slip wire drawing machine with 7" finish block. Belt drive. In good condition. Address Box 331
WIRE & WIRE PRODUCTS

Hartley Wire To Produce Special Carboloy Dies

A 100 per cent increase in factory floor space to accommodate new equipment for the production of Carboloy "shape" and other special dies is announced by **Hartley Wire Die Company,** Thomaston, Conn. The expansion, according to E. W. Hartley, President, permits production of all types of special Carboloy dies including those used in the manufacture of bullets, shells, and other armament parts in connection with the National Defense program, in addition to the Carboloy wire drawing dies normally produced by the company.

✦ ✦ ✦

PRODUCTION of the new dies will be under the supervision of **Anton Berg,** formerly a supervisor in the Carboloy Company and now released to Hartley by that company. Under the arrangements the Hartley Company will perform all the processing necessary on the special dies which it will produce, with the exception of the manufacture of the cored nibs, which will be supplied to Hartley by the Carboloy Company.

✦ ✦ ✦

Northern Electric Co. Employees Lost In War

NORTHERN Electric Co., Ltd., Montreal, Canada, has lost three of their leading technical men due to enemy action. The three men were en route to England on business connected with war production. Two other employees of the company were fortunately saved.

✦ ✦ ✦

THOSE lost were **Arthur Deadman,** who joined Northern Electric in 1923 and became tool room foreman; **Hugh P. Ray,** who joined the company in 1909 in the technical department of the plant and who recently became a superintendent, and **Stanley Almond,** who joined N. E. about 12 years ago, and became chief technical inspector.

ROYLE
PATERSON N.J.
BUILDING EXTRUDERS SINCE 1880
Insulating Machinery for Western Electric Continuous Vulcanizing process.
JOHN ROYLE & SONS
PATERSON, N. J.
British Agency: James Day (Machinery) Ltd., The Grange Whetstone Nr. Leicester, England

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WINDING AND SPECIAL MACHINES
SINFRA WIRE COVERING MACHINES
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INSULATED WIRE AND RUBBER HOSE
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43 CHURCH ST. PAWTUCKET, R. I.

DAVIS
SPARKERS
R. L. DAVIS ELECTRIC CO.
340 Center Street,
Wallingford, Conn.

WRAPPING MACHINES
Coil & Straight Length
TERKELSEN MACHINE CO.
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SPOOLS AND REELS
FOR THE WIRE INDUSTRY
Hubbard Spool Company
1622 Carroll Ave. Chicago, Ill.

SCOTT TESTERS
For WIRE, RUBBER, TEXTILES, PAPER, Etc.
HENRY L. SCOTT CO.
PROVIDENCE, R. I.

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THOMSON-JUDD
WIRE MACHINERY COMPANY
SUBSIDIARY OF
THOMSON-GIBB ELECTRIC WELDING COMPANY
LYNN, MASSACHUSETTS.
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WHERE TO BUY

For more complete information, consult the annual Wire and Wire Products Directory, Index & Buyers' Guide.

ABRASIVES—
Norton Co., Worcester, Mass.

ACCUMULATORS—
Farrel-Birmingham Co., Inc., Ansonia, Conn.

AIR DRAW FURNACES—
Carl-Mayer Corp., The, Cleveland, Ohio.

ANNEALING MACHINES—Open Flame
Syncro Machine Co., Rahway, N. J.

ANNEALING POTS AND BOXES—
National Annealing Box Co., Washington, Penna.
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.

ANODES—Nickel
Seymour Mfg. Co., Seymour, Conn.

ARMORING EQUIPMENT—
American Insulating Mach'y. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

AUTOMATIC SPARK TESTING EQUIPMENT—
Entwistle, James L., Pawtucket, R. I.

BAKERS—Hi-Speed
Carl-Mayer Corp., The, Cleveland, Ohio.

BAKERS—Rod and Wire
Carl-Mayer Corp., The, Cleveland, O.
Morgan Construction Co., Worcester, Mass.
Moslo Machinery, Inc., Cleveland, O.
Ross, J. O., Engineering Corp., New York, N. Y.

BANBURY MIXERS—
Farrel-Birmingham Co., Inc., Ansonia, Conn.

BERYLLIUM COPPER—Strip and Bars
Callite Tungsten Corp., Union City, N. J.

BLOCKERS—
Farrel-Birmingham Co., Inc., Ansonia, Conn.

BOBBINS—Braider and Wire Weaving
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L., Mfg. Co., Rockford, Ill.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

BORON CARBIDE—
Norton Co., Worcester, Mass.

BRICKS—Acid Proof
Keagler Brick Co., Steubenville, Ohio.

CALIPERS—Roll
Farrel-Birmingham Co., Inc., Ansonia, Conn.

CARRIERS—Braider, High Speed
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.

CASTINGS—Wire Mill
Farrel-Birmingham Co., Inc., Ansonia, Conn.

CEMENTS—Refractory
Norton Co., Worcester, Mass.

CHEMICALS—Cleaning
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

CLEANERS—Hand and Metal
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

CLEANING & PICKLING EQUIPMENT—
Broden Construction Co., Cleveland, O.
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wilson, Lee, Engineering Co., Cleveland, O.

CLOTH TESTERS—
Scott, Henry L., Co., Providence, R. I.

CLOTH—Wire, All Metals
Callite Tungsten Corp., Union City, N. J.

COATING—Protective
American Lanolin Corp., Lawrence, Mass.

COILERS—Sheet, Strip and Wire
Broden Construction Co., Cleveland, O.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Ruesch, H. J., Machine Co., Newark, N. J.

WHERE TO BUY, Continued

COILERS AND SPOOLERS FOR INSULATED WIRES—
Entwistle, James L., Pawtucket, R. I.

COLD HEADERS—
Waterbury Farrel Fdry. & Machine Co., Waterbury, Conn.

COMPOUNDS—Wire Drawing
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

COPHOLDERS—Steel
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

CRANES—Wire Mill
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, O.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

CUTTING TOOLS—Carbide
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Vascoloy-Ramet Corp., North Chicago, Ill.

DIAMONDS—Industrial
Callite Tungsten Corp., Union City, N. J.

DIAMOND POWDERS—
Rusch Wire Die Corp., New York, N. Y.

DIAMOND TOOLS—
Rusch Wire Die Corp., New York, N. Y.

DIES—Diamond
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Cochaud Wire Die Co., New York, N. Y.
Fort Wayne Wire Die, Inc., Fort Wayne, Indiana.
Kelly Wire Die Corp., New York, N. Y.
Krause, F., & Co., Inc., Jersey City, N. J.
Rusch Wire Die Corp., New York, N. Y.
Vianney Wire Die Works, New York, N. Y.
Wayne Wire Die Co., Jersey City, N. J.

DIES—Lead Extrusion
Robertson, John, Co., Brooklyn, N. Y.

DIES—Repairs & Re-Cutting
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Cochaud Wire Die Co., New York, N. Y.
Firth-Sterling Steel Co., McKeesport, Pa.
Fort Wayne Wire Die, Inc., Fort Wayne, Indiana.
Kelly Wire Die Corp., New York, N. Y.
Krause, F., & Co., Inc., Jersey City, N. J.
Rusch Wire Die Corp., New York, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.
Wayne Wire Die Co., Jersey City, N. J.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Rod and Tube Drawing
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Tungsten Electric Corp., Union City, N. J.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Tantalum Carbide
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.

DIES—Tungsten Carbide
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Tungsten Electric Corp., Union City, N. J.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.
Willey's Carbide Tool Co., Detroit, Mich.

DIRECT ELECTRIC RESISTANCE HEAT TREATING
Trauwood Engineering Co., Cleveland, Ohio.

DRAW BENCHES—
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
Standard Machinery Co., Providence, R. I.
Vaughn Machinery Co., Cuyahoga Falls, O

DRUMS—Flange Steel
Stevens Metal Products Co., Niles, O.

DRUMS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.

ENGINEERS—Consulting Wire Mill
Hartley, George D., Worcester, Mass.
Lewis, Kenneth B., Worcester, Mass.

EQUIPMENT—Insulation Testing
Davis, R. L., Electric Co., Wallingford, Conn.
Entwistle, James L., Pawtucket, R. I.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FLASH BAKER—
Carl-Mayer Corp., The, Cleveland, Ohio

FURNACES—Annealing
Carl-Mayer Corp., The, Cleveland, O.
Electric Furnace Co., Salem, O.
Surface Combustion Corp., Toledo, Ohio.
Trauwood Engineering Co., Cleveland, Ohio.
Wilson, Lee, Engineering Co., Cleveland, O.

FURNACES—Automatic
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, O.
Surface Combustion Corp., Toledo. Ohio.
Wilson, Lee, Engineering Co., Cleveland, O.

FURNACES—Brazing
Electric Furnace Co., Salem, O.
Firth-Sterling Steel Co., McKeesport, Pa.

FURNACES—Bright Annealing
Electric Furnace Co., Salem, O.
Surface Combustion Corp., Toledo. Ohio.
Wilson, Lee, Engineering Co., Cleveland, O.

FURNACES—Electric
Electric Furnace Co., Salem, O.
Surface Combustion Corp., Toledo. Ohio.
Trauwood Engineering Co., Cleveland, Ohio.

FURNACES—Hardening and Tempering
Carl Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, O.
Surface Combustion Corp., Toledo. Ohio.
Trauwood Engineering Co., Cleveland, Ohio.

FURNACES—Lead Melting
Electric Furnace Co., Salem, O.
Robertson, John, Co., Brooklyn, N. Y.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Non-Oxidizing
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, O.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Normalizing
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, O.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Salt Bath
Electric Furnace Co., Salem, O.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Wire, Strip & Sheet
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, O.
Surface Combustion Corp., Toledo. Ohio.
Wilson, Lee, Engineering Co., Cleveland, O.

GALVANIZING EQUIPMENT—
Wilson, Lee, Engineering Co., Cleveland, O.

GALVANIZING KETTLES—
National Annealing Box Co., Washington, Pa.

GATES—Blast, For Low Pressure Air
Farrel-Birmingham Co., Inc., Ansonia, Conn.

GEARS—Continuous Tooth Herringbone
Farrel-Birmingham Co., Inc., Ansonia, Conn.

GEARS—Wire Mill
Farrel-Birmingham Co., Inc., Ansonia, Conn.

GRINDERS—ROLL
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Norton Co., Worcester, Mass.

HI-SPEED BAKERS—
Carl-Mayer Corp., The, Cleveland, Ohio.

HOISTS—Electric Traveling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.

INSTRUMENTS—Electrical
Entwistle, James L., Pawtucket, R. I.

KETTLES—Galvanizing, Annealing, Tinning, etc.
Farrel-Birmingham Co., Inc., Ansonia, Conn.

LATHES—Die Reaming
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

LIME—
Warner Co., The, Bellefonte, Pa.

LIQUID FOAM BLANKET—
Dewey & Almy Chemical Co., Cambridge, Mass.

LUBRICANTS—For Metal Cutting, Stamping and Drawing
Miller, R. H. & Co., Homer, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

LUBRICANTS—Wire Drawing
Miller, R. H. & Co., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

MACHINERY—Armoring (Cable, Wire Hose)
American Insulating Mach'y. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Robertson, John, Co., Brooklyn, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Braiding
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Brazing
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.

MACHINERY—Bunching
American Insulating Mach'y. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Bundling, Scrap
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.

MACHINERY—Cable, Electric
American Insulating Mach'y. Co., Phila., Pa.
Entwistle, James L., Pawtucket, R. I.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Chain Making
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Closing
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Coil Winding
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Coilers
Broden Construction Co., Cleveland, O.
Entwistle, James L., Pawtucket, R. I.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Morgan Construction Co., Worcester, Mass.
New England Butt Co., Providence, R. I.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Waterbury-Farrel Fdry. & Machine Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Copper Wire Drawing and Rolling
Cook, John, Engr. Co., Paterson, N. J.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Rahway, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Machine Co., Waterbury, Conn.

MACHINERY—Covering Wire
Fidelity Machine Co., Philadelphia, Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Cutting
Broden Construction Co., Cleveland, O.
Hallden Machine Co., Thomaston, Conn.
Lewis Machine Co., The, Cleveland, O.
Moslo Machinery Inc., Cleveland, O.
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Shuster, F. B., Co., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.

WHERE TO BUY, Continued

MACHINERY—Die Making
Firth-Sterling Steel Co., McKeesport, Pa.

MACHINERY—Draw Benches
Standard Machinery Co., Providence, R. I.

MACHINERY—Edging
Standard Machinery Co., Providence, R. I.

MACHINERY—Enameling
American Insulating Mach'y. Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Extruding
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Robertson, John, Co., Brooklyn, N. Y.
Royle, John & Sons, Paterson, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Flat Wire
Broden Construction Co., Cleveland, O.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Forming
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.

MACHINERY—Galvanizing
Wilson, Lee, Engineering Co., Cleveland, O.

MACHINERY—Galvanizing Wire
Broden Construction Co., Cleveland, O.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wilson, Lee, Engineering Co., Cleveland, O.

MACHINERY—Gang Winders
Fidelity Machine Co., Philadelphia, Pa.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., Worcester, Mass.

MACHINERY—Grinding, Roll
Farrel-Birmingham Co., Inc., Ansonia, Conn.

MACHINERY—Insulating
American Insulating Mach'y. Co., Phila., Pa.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Royle, John & Sons, Paterson, N. J.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Knitting
Fidelity Machine Co., Philadelphia, Pa.

MACHINERY—Lead Encasing
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Robertson, John, Co., Brooklyn, N. Y.

MACHINERY—Lead Stripping
Robertson, John, Co., Brooklyn, N. Y.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Magnet Wire
American Insulating Mach'y. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Material Handling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.

MACHINERY — Measuring Wire & Cable
Davis, R. L., Electric Co., Wallingford, Conn.
Durant Mfg. Co., Milwaukee, Wis.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack
Glader, Wm., Machine Works, Chicago, Ill.
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Panning
American Insulating Mach'y. Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Paper Covering Wire
Terkelsen Machine Co., Boston, Mass.

MACHINERY—Pointing
Broden Construction Co., Cleveland, O.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Machine Co., Waterbury, Conn.

MACHINERY—Rod Mill
Broden Construction Co., Cleveland, O.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.

MACHINERY—Rolling Mill
Broden Construction Co., Cleveland, O.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Waterbury-Farrel Fdry. & Machine Co., Waterbury, Conn.

MACHINERY—Rubber for Insulating Wire
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Royle, John & Sons, Paterson, N. J.

MACHINERY—Rubber Strip Covering
Farrel-Birmingham Co., Inc., Ansonia, Conn.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Rubber Tubing and Straining
Farrel-Birmingham Co., Inc., Ansonia, Conn.
New England Butt Co., Providence, R. I.
Royle, John & Sons, Paterson, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Screw Wire
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Special
American Insulating Mach'y. Co., Phila., Pa.
Broden Construction Co., Cleveland, O.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
New England Butt Co., Providence, R. I.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I. (Special Designs)
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spooling
American Insulating Mach'y. Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Machine Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spring Making
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Staple
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Straightening
Broden Construction Co., Cleveland, O.
Hallden Machine Co., Thomaston, Conn.
Lewis Machine Co., The, Cleveland, O.
Moslo Machinery, Inc., Cleveland, O.
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Ruesch, H. J., Machine Co., Newark, N. J.
Shuster, F. B., Co., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Stranding
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Strip Steel
Broden Construction Co., Cleveland, O.
Ruesch, H. J., Machine Co., Newark, N. J.

MACHINERY—Swaging
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Waterbury-Farrel Fdry. & Machine Co., Waterbury, Conn.

MACHINERY—Taping
American Insulating Mach'y. Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Testing
Entwistle, James L., Pawtucket, R. I.
Scott, Henry L., Co., Providence, R. I.

MACHINERY—Testing Size of Wire
Davis, R. L., Electric Co., Wallingford, Conn.

MACHINERY—Testing—Spring
Standard Machinery Co., Providence, R. I.

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y. Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Trolley Wire
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill
Ruesch, H. J., Machine Co., Newark, N. J.

MACHINERY—Welding Wire
Micro Products Co., Chicago, Ill.
Shuster, F. B., Co., New Haven, Conn.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.

MACHINERY—Winding
American Insulating Mach'y. Co., Phila., Pa.
Entwistle, James L., Pawtucket, R. I.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt, Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Drawing
American Insulating Mach'y. Co., Phila., Pa.
Broden Construction Co., Cleveland, O.
Cook, John, Engr. Co., Paterson, N. J.
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Machine Co., Waterbury, Conn.

MACHINERY—Wire Measuring
Durant Mfg. Co., Milwaukee, Wis.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Rope
New England Butt Co., Providence, R. I.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Tinning
American Insulating Mach'y. Co., Phila., Pa.
New England Butt, Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Wood Screw
National Machinery Exchange (Used), New York, N. Y.

MACHINERY—Wrapping Wire
Terkelsen Machine Co., Boston, Mass.

MATERIAL HANDLING EQUIPMENT—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.

MILLS—Rod, Bar, etc.
Farrel-Birmingham Co., Inc., Ansonia, Conn.

MILLS—Strip, Hot and Cold For Iron, Steel, Copper, Brass, etc.
Farrel-Birmingham Co., Inc., Ansonia, Conn.

MILLS—Tandem Rolling and Edging
Standard Machinery Co., Providence, R. I.

NICKEL SILVER AND PHOSPHOR BRONZE—Rod, Wire and Strip
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.

OILS—Wire Drawing
Standard Industrial Compounds Co., Chicago, Ill.

WHERE TO BUY, Continued

OVENS—Industrial
Carl-Mayer Corp., The, Cleveland, Ohio.
Ross, J. O., Engineering Corp., New York, N. Y.

PANS—Lead and Spelter
National Annealing Box Co., Washington, Penna.

PANS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.

PAPER—Creped Wrapping
Crepe-Kraft Co., Inc., Newark, N. J.

PAPER TESTERS—
Scott, Henry L., Co., Providence, R. I.

PATENT ATTORNEYS—
Lancaster, Allwine and Rommel, Washington, D. C.

PICKLING TANK LININGS—
Keagler Brick Co., Steubenville, Ohio.

PLASTIC TESTERS—
Scott, Henry L., Co., Providence, R. I.

POTS—Lead Melting
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Robertson, John, Co., Brooklyn, N. Y.

PRESSES—Hydraulic and Mechanical
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Robertson, John, Co., Brooklyn, N. Y.
Standard Machinery Co., Providence, R. I. (Mechanical Only)

PRESSES—Lead
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Robertson, John, Co., Brooklyn, N. Y.

PRESSURE VESSELS—
National Annealing Box Co., Washington, Pa.

PULLERS—Wire
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

PUMPS—Hydraulic
Robertson, John, Co., Brooklyn, N. Y.

RECORDERS—Fault and Reel
Entwistle, James L., Pawtucket, R. I.

REEL AND TENSION STAND—
Fidelity Machine Co., Philadelphia, Pa.
Moslo Machinery, Inc., Cleveland, O.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.

REEL CRUTCHES—
Watson Machine Co., Paterson, N. J.

REELS—Annealing and Stranding
American Pulley Co., Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery, Inc., Cleveland, O.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Shuster, F. B., Co., New Haven, Conn.
Stevens Metal Products Co., Niles, O.

REELS—Constant Tension
Farrel-Birmingham Co., Inc., Ansonia, Conn.

REELS—Steel
American Pulley Co., Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REELS AND SPOOLS—Shipping and Shop
American Pulley Co., Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L., Mfg. Co., Rockford, Ill.
Hayward, R. B., Co., Chicago, Ill
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REELS—Takeoff
American Pulley Co., Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery Inc., Cleveland, O.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Shuster, F. B. Co., New Haven, Conn.
Stevens Metal Products Co., Niles, O.

REELS—Vulcanizing and Impregnating
Apco Mossberg Co., Attleboro, Mass.
Hayward, R. B., Co., Chicago, Ill
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Shuster, F. B., Co., New Haven, Conn.
Stevens Metal Products, Co., Niles, O.

REELS—Wire Drawing
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L., Mfg. Co., Rockford, Ill.
Hayward, R. B., Co., Chicago, Ill
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery, Inc., Cleveland, O.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products, Co., Niles, O.

REFRACTORIES—High Temperature
Norton Co., Worcester, Mass.

ROD BAKERS
Carl-Mayer Corp., The, Cleveland, O.
Moslo Machinery, Inc., Cleveland, O.
Ross, J. O., Engineering Corp., New York, N. Y.

RODS—Wire—Non-Ferrous
Hudson Wire Co., Ossining, N. Y.
Platt Bros. & Co., The, Waterbury, Conn.
Seymour Mfg. Co., Seymour, Conn.

RODS—Wire—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.

ROLLS—Iron, Steel, Alloy
Farrel-Birmingham Co., Inc., Ansonia, Conn.

ROLLS—For Strip, Rod, Bar Mills
Farrel-Birmingham Co., Inc., Ansonia, Conn.

ROLL STRAIGHTENERS—
Moslo Machinery, Inc., Cleveland, O.

RUBBER AND RUBBER COMPRESSION TESTERS—
Scott, Henry L., Co., Providence, R. I.

RUST PROOF COMPOUND—
American Lanolin Co., Lawrence, Mass.

SHEET—Steel
Continental Steel Corp., Kokomo, Indiana.

SOAPS—Industrial and Wire Drawing
Miller, R. H., & Co., Homer, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

SPARK TESTING EQUIPMENT—
Entwistle, James L., Pawtucket, R. I.

SPOOLS—Annealing and Wire Drawing
American Pulley Co., Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Chicago, Ill.

SPOOLS—Shipping and Shop
American Pulley Co., Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L., Mfg. Co., Rockford, Ill.
Hayward, R. B., Co., Chicago, Ill
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

SPOOLS—Steel
American Pulley Co., Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L., Mfg. Co., Rockford, Ill.
Hayward, R. B., Co., Chicago, Ill
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

STAMPINGS—Steel
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

STRIP—Brass and Non Ferrous
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Firth-Sterling Steel Co., McKeesport, Pa.

STRIP METAL TESTERS—
Scott, Henry L., Co., Providence, R. I.

SWIFTS—Take-off
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.

TAKE-UPS FOR CABLE, HOSE, LEAD PRESSES AND SHEET RUBBER—
Entwistle, James L., Pawtucket, R. I.

TANK LININGS—Brick
Keagler Brick Co., Steubenville, Ohio.

TANKS—Compound
Watson Machine Co., Paterson, N. J.

TANKS—Steel
Mossberg Pressed Steel Corp., Attleboro, Mass.

TENSILE TESTERS—
Scott, Henry L., Co., Providence, R. I.

TESTING INSTRUMENTS—
Entwistle, James L., Pawtucket, R. I.
Scott, Henry L., Co., Providence, R. I.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.

TREADS—Safety
Norton Co., Worcester, Mass.

TRUCKS—
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

TUBE BENDERS AND FORMERS—
Ruesch, H. J., Machine Co., Newark, N. J.

TURKS HEAD—Friction and Power Driven
Standard Machinery Co., Providence, R. I.

VULCANIZERS—
Watson Machine Co., Paterson, N. J.

VULCANIZING PANS—
American Insulating Mach'y. Co., Phila., Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.

WELDERS—Spot and Butt
Micro Products Co., Chicago, Ill.
Moslo Machinery, Inc., Cleveland, O.

WIRE—Cold Heading
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Keystone Steel & Wire Co., Peoria, Ill.

WIRE DRAWING — High Grade Custom
Hy-Carbo Steel Co., Lowell, Mass.

WIRE—Electric
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.

WIRE—Enameled For Coils
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Manufacturers
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Firth-Sterling Steel Co., McKeesport, Pa.
Keystone Steel & Wire Co., Peoria, Ill.

WIRE—Nickel Silver and Phosphor Bronze
Callite Tungsten Corp., Union City, N. J.
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.

WIRE—Non Ferrous to Specification For Special Purposes
Callite Tungsten Corp., Union City, N. J.
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Spring
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Firth-Sterling Steel Co., McKeesport, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Seymour Mfg. Co., Seymour, Conn.

WIRE—Stainless Steel
Callite Tungsten Corp., Union City, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.

WIRE—Steel—Also Coppered Steel—Also Galvanized Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Keystone Steel & Wire Co., Peoria, Ill.

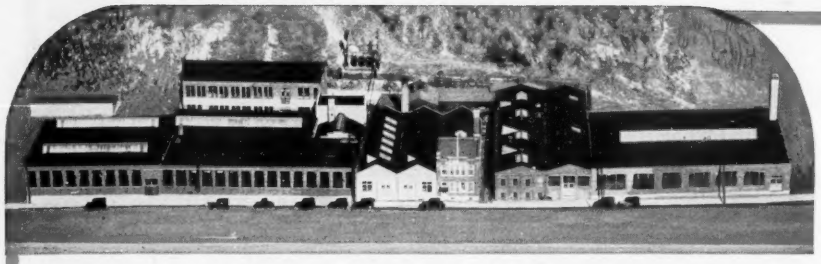
WIRE AND STRIP—Zinc
Platt Bros. & Co., The, Waterbury, Conn.

WIRE TESTERS—
Scott, Henry L., Co., Providence, R. I.

WIRE, WEAVING—Non Ferrous
Hudson Wire Co., Ossining, N. Y.

WRAPPING PAPER—Creped
Crepe-Kraft Co., Inc., Newark, N. J.

YARN TESTERS—
Scott, Henry L., Co., Providence, R. I.



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HUDCO

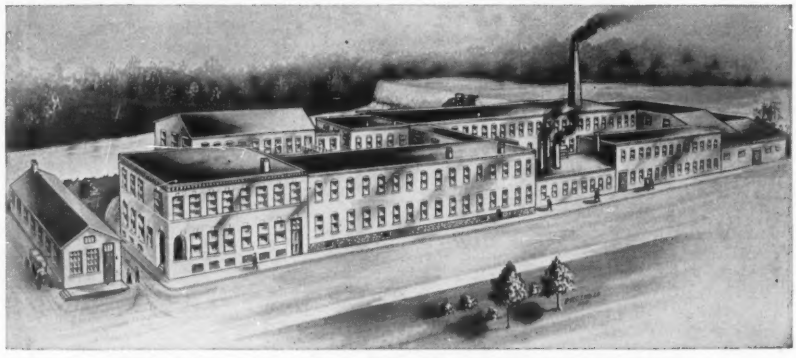
FINE WIRES IN ALL METALS

TWO MODERN AND COMPLETE WIRE PLANTS—— AT YOUR SERVICE——

LET US QUOTE ON YOUR WIRE REQUIREMENTS

WINCO

LEAKPROOF ENAMELLED WIRE



Winsted Divn. of HUDSON WIRE CO. at Winsted, Conn.

HUDCO

FINE BARE WIRES

High Brass, Low Brass, Zinc 99.99+ and High Tensile Zinc, Commercial Bronze, Phosphor Bronze, Pure Tin, Lead, Antimonial Lead, Tinsel Lahns, Silver Plated Copper, False Gold and Copper.

Cadmium, Nickel Silver, 10%, 18% and 30%; Silver Plated Copper, False Gold and Special Brass and Bronze Alloys to Specification. Metallic Fibre for Packing Purposes, Copper, Bronze, Zinc, Lead and Aluminum.

WIRES FOR METAL SPRAYING

Pure Lead, Lead Alloy, Pure Zinc, Zinc Alloy, Copper, Tin, High Brass, Low Brass, Solder Wire, High Conductivity, Electric Wire.

Cadmium, Nickel Silver, (10%, 18%, 30%); Aluminum, Monel Metal, Phosphor Bronze, Pure Nickel, Commercial Bronze.

"HUDCO" specially processed Copper Wire for enamelling purposes is drawn from Selected Copper, insuring the maximum conductivity. This is but one example of the use of the most advanced and approved materials and methods in our processing. BETTER WIRE AT LOWER COST.

LET US QUOTE

HUDSON WIRE COMPANY

OSSINING, N. Y.

SUCCESSORS ROYLE & AKIN

ESTAB. 1902 ESTAB. 1902

WINCO

LEAKPROOF ENAMELLED WIRES

Drawn from special oxygen-free copper that works so clean, so free from slivers, that enamelling is perfect. Leaks positively prevented. Every foot of WINCO enamelled wire is mercury tested before shipment to assure a wire perfect in every particular.

WINCO enamelled wire is covered to the same dimensions as fabric-covered wire so the user need not change his equipment. It will withstand softening in varnish-dipping and baking.

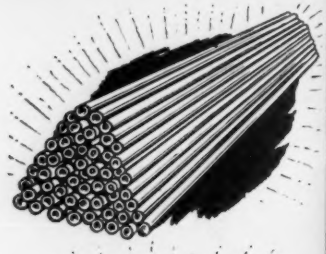
WINCO enamelled wire is lower in cost than silk covered wire. Write for sample.

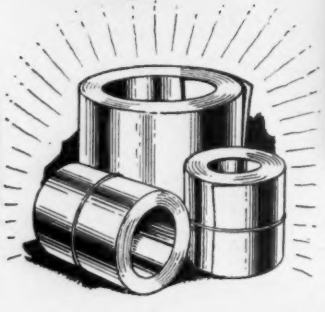
LET US QUOTE

WINSTED DIVISION

HUDSON WIRE COMPANY

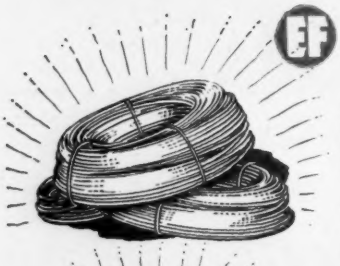
WINSTED, CONN.

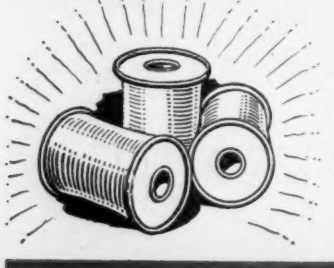




and there's Brightness in Tubing

Wire, Strip, Stampings, etc., Annealed in





EF SPECIAL ATMOSPHERE FURNACES

Ferrous and non-ferrous products—including strip, tubing in coils or lengths; stampings; wire in coils, on spools or large reels; and metals in many other forms are uniformly and economically bright annealed—both continuously and by the batch method in various types of **E F** electric and fuel fired furnaces.

The above illustration shows an **E F** continuous special atmosphere bright annealing furnace heated by **E F** gas fired recuperative type radiant tubes. This furnace handles large and small coils of copper tubing as well as straight lengths.

We build furnaces for bright annealing, scale-free hardening, forging, copper brazing, nitriding, normalizing, billet heating, and for every other heating and heat treating process.

Submit **your** furnace problems to **E F** engineers. With years of furnace building experience—with hundreds of successful installations operating on practically every product and process, and with both electric and fuel divisions, we are in a position to analyze any furnace or heat treating problem, give an unbiased report, and recommend and build the best size and type furnace for the job. We solicit your inquiries.

ELECTRIC EF FURNACES FUEL FIRED

The Electric Furnace Co., Salem, Ohio

Gas Fired, Oil Fired and Electric Furnaces---For Any Process, Product or Production